USDA

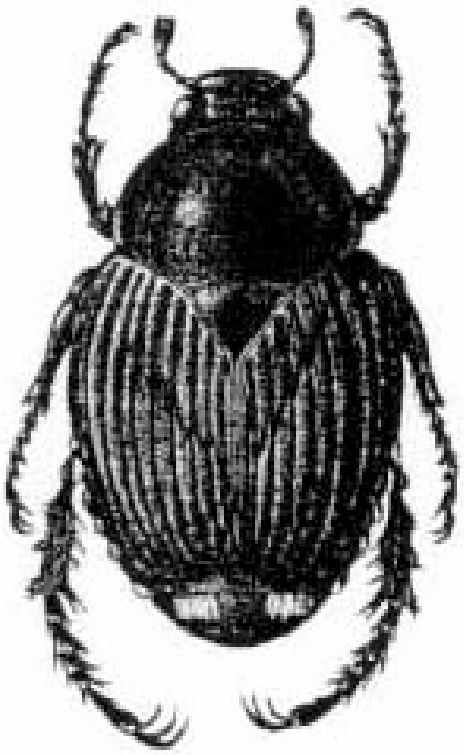
United States Department of Agriculture

Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

Japanese Beetle Program Manual



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Japanese Beetle Program Manual

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Japanese Beetle Program Manual

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Purpose

Mission of APHIS

The Animal and Plant Health Inspection Service (APHIS) is an Agency within the United States Department of Agriculture (USDA). The mission of APHIS is to protect the animal and plant resources of the United States.

Mission of PPQ

Among other activities, Plant Protection and Quarantine (PPQ), a unit within APHIS, is responsible for preventing the spread of significant plant pests. Because of the extensive damage which it causes, the Japanese beetle (JB), *Popillia japonica* Newman, is a significant pest.

Japanese Beetle Policy

A primary objectives of APHIS-PPQ is to protect the agriculture of the Western United States and prevent the artificial spread of the Japanese beetle from the Eastern United States. Artificial spread is the movement of an organism to a new area by other than natural means; in this case, artificial spread refers specifically to the movement of JBs

on aircraft. This Japanese Beetle Program Manual will help APHIS-PPQ personnel and cooperators prevent the artificial spread of the JB.

Seven Western States need to be protected from infestation by the Japanese beetle: Arizona, California, Idaho, Nevada, Oregon, Utah, and Washington.

JB Program Manual Tasks

Specifically, this manual will address the following tasks:

- Monitoring airports in JB-infested areas
- Determining the risk at JB-infested airports
- Issuing Emergency Action Notifications (EANs)
- Canceling Emergency Action Notifications
- Monitoring airports in JB-free areas
- Treating aircraft
- Treating grounds
- Using Compliance Agreements (CAs)

The Japanese Beetle Program Manual is to be used with other manuals and directives.

Background

First Detection

The Japanese beetle (JB) was first found in the United States in 1916 near Riverton, New Jersey. In 1918, the USDA and New Jersey authorities attempted to exterminate this pest; however, the infestation was so well established that eradication by the control measures then in use and with the funds available was impossible.

Dispersal Information

By 1932, infestations were found as far west as St. Louis, Missouri and East St. Louis, Illinois.

By 1967, 19 States in the Eastern United States contained major or widespread infestations and four additional States had less extensive or more isolated infestations.

Transportation by aircraft threatens to introduce the JB to the Western United States.

Additional Information

Information on the life cycle of the JB is in the Chapter ***General Information***, ***Life Cycle***, as well as information on the preferred hosts. Additional information on the non-preferred hosts and non-hosts is in **Appendix A**.

Scope

The chapters in this manual are as follows:

- **Introduction**
- **General Information**
- **Compliance Agreements (CAs)**
- **Airport Monitoring and Classification**
- **Control Measures**

Introduction

The Introduction discusses the following topics:

- The purpose of the manual
- The historical background of the JB containment program
- The scope of the manual
- Intended users of the manual
- Related documents that could be used with the manual
- Information on updating the manual

General Information

General Information discusses the following topics:

- Economic importance
- Distribution
- Hosts and non-hosts
- Life cycle
- Descriptions of stages

Compliance Agreements (CAs)

Compliance Agreements discusses the following topics:

- Using the CA for monitoring airports
- Using the CA at regulated airports
- Operation under the CA

- Cancellation of the CA

Airport Monitoring and Classification

- Airport Monitoring and Classification discusses the following topics:
- Overview—the need for airport monitoring
- Monitoring airports in JB-infested areas
- Determining the risk at JB-infested airports
- Issuing Emergency Action Notifications (EANs)
- Canceling Emergency Action Notifications
- Monitoring airports in JB-free areas

Control Measures for Airports

Control Measures for Airports discusses the following topics:

- Overview
- Initiation of Control and Safety Procedures
- Treatments for Aircraft
- Treatments for Grounds

Appendixes

The Appendixes contain the following material:

Appendix A—Non-preferred Hosts and Non-hosts

Appendix B—Current Distribution of the Japanese Beetle

Appendix C—Current Map Showing JB Distribution

Appendix D—Compliance Agreement

Appendix E—Trap and Lure Distributors

Appendix F—A Technique for Larval Surveys

Appendix G—PPQ Form 523 Emergency Action Notification (EAN)

Appendix H—Japanese Beetle Notification Listt

Appendix I—Insecticide Information and Distributors

Appendix J—Aircraft Information

Appendix K—PPQ Form 250 Aircraft Clearance or Safeguard Order

Users

The primary users of this manual may include the following:

- APHIS-PPQ line personnel
  - monitoring airports
  - cooperating under Compliance Agreements
  - supervising PPQ Officers
- State/County personnel
  - monitoring airports
  - cooperating under Compliance Agreements
- Airport personnel
  - monitoring airports
  - cooperating under Compliance Agreements
  - applying pesticides

Related Documents

The following documents may supplement this manual:

1. *Code of Federal Regulations: 7—Parts 300 to 309.* Published by the Office of the Federal Register (National Archives and Records Administration) at the United States Government Printing Office, this CFR (*Code of Federal Regulations*) guide contains information on the JB in Subpart 301.48.
2. *U. S. Domestic Japanese Beetle Harmonization Plan.* Published by USDA-APHIS-PPQ, this plan establishes procedures for the free movement of JB host commodities. This plan is available at the following website:

   http://www.aphis.usda.gov/npb/jbplan98.html
3. *APHIS Agreements Management Manual.* Published by USDA-APHIS-PPQ, this manual establishes administrative policies and procedures for Cooperative Agreements (CAs) and other documents. USDA-APHIS-PPQ uses CAs to establish (1) goals and objectives, (2) funding levels and procedures, and (3) performance and/or services expected from cooperators.
4. *Collecting Environmental Monitoring Samples.* Published by USDA-APHIS-PPQ, this manual contains standard procedures for collecting, storing, and shipping environmental monitoring samples.

5. Directive 5640.1 - *Environmental Monitoring for APHIS Pest and Disease Control and Eradication Programs.* This directive discusses required environmental monitoring plans.
6. *Guidelines for Recording Environmental Monitoring Data on APHIS Form 2060 (Mar 92).* Available from the National Monitoring and Residue Analysis Laboratory, this document contains instructions on data entry for environmental samples.
7. *The United States Government Manual 1994/95.* Published by the Office of the Federal Register, National Archives and Records Administration, this manual is the official handbook of the Federal government.
8. *Treatment Manual.* Published by USDA-APHIS-PPQ, this manual contains accepted treatments for various commodities including aircraft (T409).
9. *Characters Useful in Distinguishing Larvae of "Popillia japonica" and other Introduced Scarabaeidae from Native Species.* Published by the USDA in 1934 as Circular No. 334. This circular by Robert Sim contains descriptions and illustrations of the larvae of the JB, other introduced species, and native species.
10. *Federal and State Quarantine Summaries.* Published by the American Association of Nurserymen in cooperation with the National Plant Board and USDA-APHIS-PPQ, this reference contains a summary of the Federal JB quarantine; in addition, this reference contains State quarantine summaries which often mention the Japanese beetle.
11. *Aerial Application Manual.* Published by USDA-APHIS-PPQ, this is a guide for supervisors and other personnel who plan and conduct aerial application programs.
12. *Insecticide Labels and Material Safety Data Sheets (MSDSs).*
13. All labels and MSDSs for insecticides effective against the JB are valuable sources of information on the handling and application of the effective insecticides.
14. *Safety and Health Manual.* Published by USDA-APHIS-PPQ, this is a manual covering various safety and health-monitoring procedures.

Updates

Updates to this manual (Transmittals) will be prepared and distributed as needed.

When the Transmittals are received, record the Transmittal Number and the date received in the Update Record in the front of this manual. Then remove the outdated pages and replace them with the current pages.

Questions on JB Program Manual

Refer any questions concerning the use or content of the Japanese Beetle Program Manual to the following office:

Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Domestic and Emergency Programs
4700 River Road, Unit 134
Riverdale, Maryland 20737-1236
(301) 734-8247
FAX: (301) 734-8584

2 General Information

Japanese Beetle Program Manual

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Economic Importance

The JB is a highly destructive plant pest causing both plant damage and increased control costs. For many years, extremely high populations have occurred sporadically. Feeding on grass roots, the grubs damage lawns, golf courses, and pastures. Attacking foliage, flowers, or fruits, the adults feed on more than 300 different ornamental and agricultural plants.

JB control by insecticides or biological methods is often expensive due to the labor, equipment, and/or insecticides involved.

State plant pest officials in uninfested areas are concerned about the introduction of JB. To protect uninfested areas, cooperative Federal/State regulatory programs have been operating for about 50 years.

First Detection

The Japanese beetle (*Popillia japonica* Newman) was first found in the United States in 1916 near Riverton, New Jersey. In 1918, the USDA and New Jersey authorities attempted to exterminate this pest. However, because (1) the infestation was well established, (2) control measures then in use were marginally effective, and (3) funds were limited, eradication was impossible.

Since its introduction in 1916, the JB has spread throughout most of the United States east of the Mississippi. Because of the possibility of artificial spread by aircraft, the JB is a major threat to the agriculture of the Western United States.

Distribution

Distribution in the United States

East of the Mississippi

At present, JB occurs throughout most of the United States east of the Mississippi River. Several States in the Deep South are partially infested (Alabama and Georgia); Florida and Mississippi are non-infested. Tennessee is partially infested. Maine is partially infested. Several States bordering the Great Lakes are also partially infested (Michigan, Minnesota, and Wisconsin).

West of the Mississippi

Most States west of the Mississippi are non-infested; however, several States west of the Mississippi are partially infested (Iowa, Kansas, Missouri, Nebraska, and Oklahoma).

Usually, infestations in States west of the Mississippi are eradicated.

Distribution at the County Level

Using counties, Appendix B is a current list of geographical localities infested by JB.

The current map showing the distribution of JB should be placed in Appendix C. The current map is obtainable at the following website:

http://www.aphis.usda.gov/ppq/maps/jbmap.html

Distribution in Canada

Infestations in Canada, which are under regulation, are found in the Quebec Province south of Montreal and in the Ontario Province along the shores of the St. Lawrence, Lake Ontario, Lake Erie, and Lake St. Clair.

Distribution in Asia

A native of Asia, JB occurs in China, Japan, and Korea.

Hosts and Non-hosts

Host Range

Larvae feed on the roots and underground stems of plants, particularly grasses.

Adult JBs are gregarious general feeders on leaves, flowers, and fruits. Hosts include small fruits, tree fruits, truck and garden crops, ornamental shrubs, vines, and trees. Feeding studies show a host range in excess of 300 plants in 79 plant families.

Preferred Hosts

Preferred hosts are the following:

Aesculus hippocastanum	horse chestnut
Althea sp.	althea
Glycine max	soybean
Malus domestica	apple
Parthenocissus quinquefolia	Virginia creeper
Polygonum spp.	smartweed
Populus nigra	Italian poplar
Prunus spp.	cherry
P. domestica	plum
P. persica	peach
Rosa spp.	rose
Rubus spp.	raspberry
Sassafras albidum	sassafras
Tilia spp.	linden
Ulmus americana	elm
Vitis spp.	grape
Zea mays	corn
Zinnia elegans	zinnia

The adults seriously injure corn by eating the silk which interferes with pollination and the formation of kernels.

Non-preferred Hosts and Non-hosts

Although adult JB feeds on over 300 species of plants, it feeds sparingly or not at all on many cultivated plants. Some plants are rarely or never fed on; among these are the evergreens, common grains, most truck and field crops, and many of the common ornamental flowers.

The pear is the only common fruit that is not attacked.

When beetles are abundant, damage to plants may be avoided by using species that are immune or seldom attacked by the insect (Fleming, ARS Technical Bulletin No. 1545).

Appendix A lists plants that are either non-preferred hosts or non-hosts.

Life Cycle

There is usually one generation each year, but a percentage of the grubs may take 2 years to mature, especially in wet, cold soils. A diagram of a typical life cycle is on the next page. However, temperature and moisture affect the development of life stages. Therefore, in any locality the life stages will appear at varying times from year to year; in addition, the life stages will appear at varying times from north to south.

Egg Stage

The female JB burrows into the soil to a depth of about 3 inches to lay eggs. The eggs are deposited singly and only a few are laid at one time. Egg laying is intermittent and females usually deposit 40 to 60 eggs.

Larval Stage

The eggs hatch in about 2 weeks and the grubs begin to feed on grass and other roots. During the summer, the grubs feed within the upper 4 inches of soil in the turf; in late fall, they work downward in the soil as deep as 8 to 10 inches to spend the winter. In the spring, the grubs move upward and resume feeding on grass roots.

The full-grown larvae are about 1 inch long and usually lie in the soil in a curled position.

Pupal Stage

The grubs enter the pupal stage about 2 weeks before adult emergence; in other words, the pupal stage usually lasts about 2 weeks. However, the pupal stage can last from 7 days to 20 days.

Adult Stage

The adult JB is present during the warm summer months and lives above the ground.

In eastern North Carolina, the beetles begin to emerge from the soil in mid-May. In the vicinity of Philadelphia, the beetles begin to emerge about mid-June. In Tennessee, adult emergence begins in mid-June and continues until mid-August. Emergence is later in more northern locations, occurring in late June in southern New England and in early July in northern New England.

Peak adult activity occurs 4 to 6 weeks after emergence.

In eastern North Carolina, most beetles are gone by mid-August, but in New England some may live until frost.

Beetles usually fly only in the daytime, and are especially active on warm, sunny, calm days. They feed mostly on plant parts exposed to the sun. When feeding on leaves, the beetles chew out parts between the veins leaving a lace-like

A diagram of the life cycle is below.

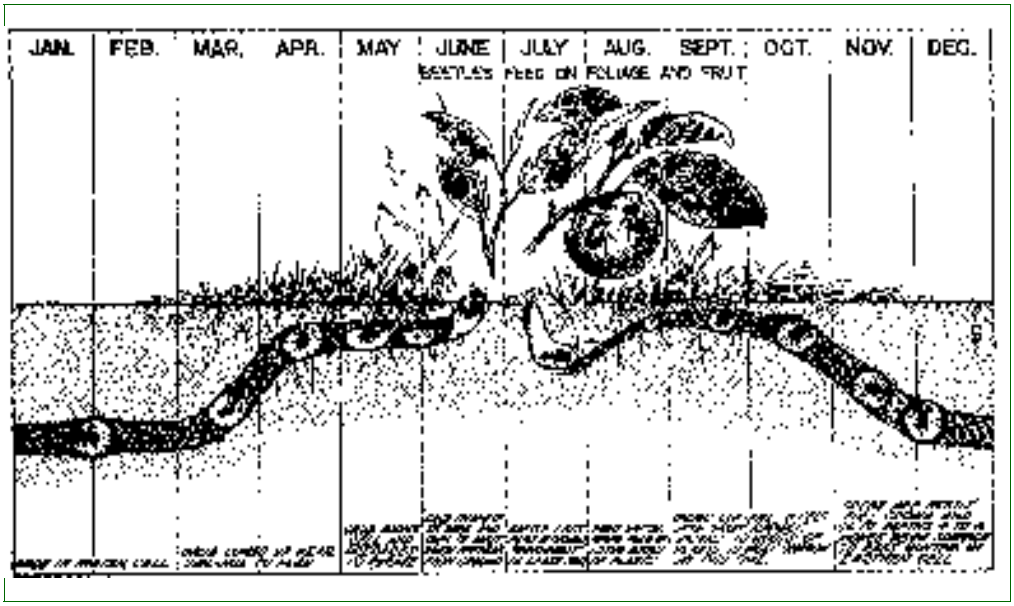

FIGURE 2-1: Diagram of the life cycle Japanese Beetle larvae

Description of Life Stages

Description of Adults

Adult beetles are 10 to 12 millimeters (mm) long; their color is shiny metallic-green with coppery-brown elytra. The beetles can readily be recognized by the presence of six small patches of white along each side and the back of the abdomen, just under the edges of the elytra.

Description of Larvae

Length 23 mm.

Form Medium

Width of Head 3 mm.

Surface of Head Smooth, shining. Epicranial stem a fine, dark, impressed line. Epicranial arm not conspicuous. Front with a short, vague, longitudinal, median impression in apical third. At each side of this is a row of five punctures diverging toward the middle bend of epicranial arm.

Color of Head Pale dull yellow.

Epipharynx Sensory eminence with a strong, angled, sclerotized plate in right side. Several sensillae of two sizes near base of the group of three large, fixed teeth. Right torma long, slender, slightly sinuate; left torma very slender with apical third curved toward apex of labrum and with a rather large basal expansion. (Tormae are blackish sclerotized plates.)

Raster Numerous coarse, rather long, scattered, brown, hooked spines. Medially, two conspicuous, divergent rows of shorter, straight spines in V form; 6 or 7 spines in each row. At sides and end of tenth segment, numerous rather long, yellowish hairs.

Anal Slit Transverse, arcuate.

Vestiture Entire grub with rather long scattered brown hairs. Dorsal convexities of first six abdominal segments clothed with fine, short, brown spines.

Habitat Soil under turf.

The distinct V-like arrangement of short dark spines of the raster is sufficient to identify this species: Two rows of six or seven conspicuous, short, straight spines are arranged in a V-shape on the underside of the last body segment.

A micrometer eyepiece can be used to measure the length and width of the head capsule; these measurements serve as an index for identifying the different larval stages.

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Japanese Beetle Program Manual

Compliance Agreements (CAs)

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Definition of Compliance Agreement

A Compliance Agreement (CA) is a written agreement between APHIS and a person or institution engaged in growing, handling, or moving regulated articles.

If aircraft are likely to be JB-infested, they are considered regulated articles. As regulated articles, aircraft likely to be infested are subject to regulation and, if needed, treatment.

Using the CA for Monitoring Airports

The CA and Airport Monitoring Goals

Airport monitoring will determine if a hazardous JB level exists at an airport or a portion of an airport. A CA is useful when establishing the goals and responsibilities of an airport monitoring program:

- How will the airport monitoring be done?
- When will airport monitoring start and stop?
- Who will do the work?

See the chapter on airport monitoring.

The CA and Goals at Regulated Airports

When a hazardous JB population exists at an airport or a portion of an airport, a CA is useful to establish the goals and responsibilities at the regulated airport:

- How will aircraft be handled and/or treated?
- Will the grounds need treatment?
- If the grounds need treatment, how will the grounds be treated? When will treatments start?
- Who will do the work?

Appendix D contains information on the CA. See the chapter **Control Measures**

Operating Under a CA

Inspectors

Inspectors can be (1) any employee of APHIS or (2) any individual authorized by APHIS to enforce the JB quarantine.

Access for Inspectors

Any person who enters into a CA (and employees or agents of that person) must allow inspectors access to all areas where regulated material are handled. Along with other areas, these areas include the following:

Aircraft-operating areas at regulated airports where loading, unloading, servicing, and/or treatment of aircraft occur

Aircraft-operating areas at airports in JB-free areas where unloading and servicing (and possibly treatment) occur

Record Keeping and the CA

Any person who enters into a CA (and employees or agents of that person) must allow inspectors access to all records regarding treatment.

Applicators treating aircraft or supervising aircraft treatments must keep their records for 2 years. If inspectors request records for review, the records must be presented.

Canceling a CA

If inspectors determine that compliance was not satisfactory, they may cancel CAs. The cancellation may be written or oral. If the cancellation is oral, within 20 days of cancellation the inspector will write a letter that (1) confirms the oral cancellation and (2) states the reasons for the cancellation.

Appeal of Cancellation—Within 10 days after receiving written notification of a cancellation, any person whose CA has been canceled may appeal the decision by writing to the APHIS Administrator. The appeal must state all facts and reasons that would show that the CA was wrongfully canceled. The APHIS Administrator will adopt rules of practice for a hearing that will resolve the conflict.

As promptly as circumstances allow, an appeal will be granted or denied in writing. The reasons for the decision will be stated.

If canceled, the CA will remain canceled pending decision of the appeal.

4 Airport Monitoring and Classification

Japanese Beetle Program Manual

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Overview

Goal of Airport Monitoring

The goal of airport monitoring is to assess the three major factors that will indicate the level of risk:

- The level of the JB population
- The amount of JB activity near aircraft-operating areas (which include passenger-boarding, luggage-handling, and/or cargo-loading areas)
- The risk of JB entry into aircraft

The information gathered when monitoring will allow the subsequent classification of the entire airport or a part of the airport.

Goal of Airport Classification

The goal of airport classification is to classify airports in the JB-infested area into either a regulated or non-regulated status. This classification into regulated and non-regulated airports is based on the threat that the airports pose to the JB-free areas. In the JB-free area, seven Western States need to be protected: Arizona, California, Idaho, Nevada, Oregon, Utah, and Washington.

Regulated airports in the JB-infested areas under quarantine should be those airports where the JB is likely to enter aircraft and be transported to JB-free areas. APHIS will issue an Emergency Action Notification (EAN) to inform airport personnel when the airport is to be regulated. APHIS inspectors can cancel an EAN to return a regulated airport to non-regulated status.

Non-regulated airports in the JB-infested areas under quarantine should be those airports where the JB is *not* likely to enter aircraft and be transported to JB-free areas.

Monitoring Airports in JB-infested Areas

In JB-infested areas PPQ officers must survey to know the potential hazards at each airport. Monitoring surveys will determine the JB population level and the threat of entry into aircraft.

Monitoring will use one or more of the following methods:

- Trapping adult beetles
- Larval Surveys for the grubs
- Adult Visual Surveys at aircraft-operating areas

Trapping Adult Beetles

Trapping adults is a valuable monitoring method which gives a population estimate at the time when transport is most likely. Within a single season, trapping adults will determine when adult emergence begins, peaks, and ends. Over several seasons, trapping adults will detect population trends within the airport.

Number of Traps

A trapping rate of 12 traps per airport is recommended.

Trap Types

Dual-lure traps, containing both food and pheromone lures, are most effective in attracting adults. Commercial dual-lures are available and should be used.

If only a food-type lure is used, it should be PEG which is a combination of phenyl ethyl propionate, eugenol, and geraniol in a ratio of 3:7:3. Use of the food-type lure alone is not recommended.

Commercially prepared, sustained-release dispensers are available to disperse the pheromone lure for 75 to 100 days. Neither trap color nor size is a factor in trapping JB adults. JB traps are usually yellow; however, white and green traps are equally effective.

Trap Capacity

The capacity of the trap is not a factor in detection programs; however, if mass-trapping is done to reduce a population, large capacity traps are necessary. (Mass-trapping to reduce a JB population may cause more problems than it eliminates.) Large-capacity traps hold more captured beetles and require less frequent servicing.

Trap Placement

Trap placement is critical. Place traps to meet the following criteria:

- All-day sun (or at least mid-day sun). Traps placed in direct sunlight are twice as effective as those placed in the shade.
- Close proximity to host plants (but not immediate proximity). Trap placement should be 3 to 7 yards from favored trees, shrubs, and vines. Do not place traps immediately adjacent to tall, bushy plants or other objects which could interfere with dissemination of the lure.
- Placement at 22 inches above ground level. Traps baited with a pheromone attractant and PEG were most effective at 22 inches above ground level.

NOTICE

When placing traps, *never* put traps near aircraft-operating areas. Above all, *never* put traps *only* near aircraft-operating areas. Traps near aircraft-operating areas will only attract beetles into the aircraft-operating areas, creating entry problems where none existed.

Trap Examination

Examine traps periodically to ascertain that traps are completely operative. Remove contents of receptacles and clean the trap. Discard all insects other than the JB; save JB suspects for identification. Never reuse traps without inspecting for the presence of dead or live beetles.

At the end of the monitoring (or control) season, traps should be stored in a dry location. They may be stored either assembled or disassembled. Traps should be thoroughly cleaned for storage.

Appendix E contains information on trap and lure distributors.

Larval Surveys

Because of the time and effort required, larval surveys are usually done when a high-level population is likely and an insecticide treatment may be necessary. When traps for monitoring adults are not placed, larval surveys are often done to determine the most common life stage and/or the population level.

If turf damage indicates a large number of grubs in the soil, a larval survey should be done. During the spring and fall, grubs damage turf leaving the surface soft and spongy as the fibrous roots are consumed. Severely damaged turf, even though still green, can usually be rolled back like a rug. Other scarabaeid grubs produce damage similar to the damage caused by JB; therefore, identification of the damaging grubs is necessary.

Appendix F contains a larval survey method for economic populations.

Adult Visual Surveys

Adult visual surveys are commonly used to determine the level of the JB population in aircraft-operating areas. A minimal level of monitoring requires visual surveys of aircraft-operating areas in airports that were regulated in any of the last 3 years.

To coordinate visual surveys with the most threatening periods, use traps to detect the start of emergence and the peak emergence period. As an alternative, use surveys of various preferred hosts.

Peak Flight Period

Adult beetles begin to emerge in May in southern localities, later in northern localities. Peak adult activity occurs 4 to 6 weeks after emergence starts.

Frequency of the Visual Surveys

During the Peak Flight Period perform visual surveys three times per week.

Duration of the Visual Survey

Each visual survey at an aircraft-operating area should last 15 minutes.

Time, Humidity, and Temperature

Adults fly only in the daytime. Critical times to observe JB associated with aircraft would be during daylight hours on warm, sunny, and calm days when beetles are active.

Trapping has showed that 45 percent of beetle activity occurs between 10 a.m. and 1 p.m. Although captures were spread out over most of the afternoon, peak captures occurred between 1 and 2 p.m., when air temperatures were at their peak for the day. Fewer than 5 percent of the beetles were captured after 5 p.m. or before 9 a.m.

Beetles fly on clear days when the temperature reaches about 70° F and relative humidity is below 60 percent. Often, but not always, temperatures above 95°F or relative humidity above 60 percent stop or reduce flights of the adults. (In Louisville, KY, flights did occur when the temperature was near 100°F and the relative humidity was 70 percent.) When Japonilure was used alone, about 70 percent of the captures occurred between 10 a.m. and 1 p.m. and captures peaked about noon.

Rain and the Visual Survey

Adult emergence is especially heavy the day following a rainstorm. If possible, conduct visual surveys on the days following a rainstorm.

Detections on Aircraft

Airport monitoring using traps, larval surveys, and/or visual surveys may not detect a hazardous condition. A single interception at an airport in a JB-free area is an indication of a potentially hazardous condition at the originating airport.

If possible, arrange surveys of aircraft departing from JB-infested areas; these surveys are desirable, particularly at frequently regulated airports.

Reporting Monitoring Information

Biweekly Reports

When monitoring information indicates a threatening condition, biweekly reports are necessary. Even if a threatening condition is not present, biweekly reports are desirable for the exchange of information on emergence and population levels.

A typical biweekly report is as follows:

NAME OF AIRPORT:	Date to Date
Number of Traps in Trap Array:	#
Average No. of Beetles Caught per Trap per Day:	#
Number of Visual Surveys (15-minute) Conducted:	#
Average Number of Beetles per Visual Survey:	#

Determining the Risk at JB-infested Airports

NOTICE

Refer to this Section for general guidelines. Refer to the Code of Federal Regulations Section 301.48-2 (a) for legal language.

Risk Criteria

JB Population Level

The first criterion that must be evaluated is: Is the JB population at a hazardous level? Another way of stating this criterion is: Is the JB population high enough to place aircraft at risk? Aircraft at risk, referred to as at-risk aircraft, are those aircraft scheduled to fly to JB-free areas and exposed to infestation by the JB.

The detection of JB at an origin airport or in the immediate vicinity is not in itself sufficient reason for declaring the airport hazardous. Beetles must be closely associated with aircraft that are loading,

unloading, or parking during critical times; in addition, the beetles must present a danger of gaining entry to the interior of aircraft, either by direct flight or by hitchhiking on passengers' clothing or cargo.

Aircraft Operating Areas

The second criterion that must be evaluated is: Are aircraft in aircraft-operating areas likely to become infested?

Generally, high-level JB populations alone are not sufficient to cause an airport (or part of an airport) to be regulated. A high-level population may be isolated from the aircraft-operating area. However, high-level populations with high probability of aircraft infestation will necessitate airport regulation.

When medium or high adult populations are present at or adjacent to aircraft-operating areas, a hazardous condition is usually readily apparent. Light populations may be more difficult to evaluate.

Regardless of JB numbers, entry into an aircraft is likely if beetles constantly fly near or rest on the aircraft's exterior surfaces, boarding ladders, or similar items. This situation should be considered hazardous.

If a 15-minute visual survey, done under optimal conditions around an aircraft-operating area, finds two or more live adults, aircraft infestation is a highly likely.

Detections in JB-free Areas

The third criterion that must be evaluated is: Are infested aircraft arriving in JB-free areas?

A single JB interception at a protected Western State indicates a potentially hazardous condition at the originating airport or at a previous stop-over airport(s); regulation at the infested airport should be considered.

Information on how to respond to a detection is in the following section on monitoring airports in a JB-free area.

Potential Hazardous Airports

At airports expected to become hazardous, PPQ officers should determine the flight numbers and airlines of at-risk aircraft. At-risk aircraft are aircraft that fly to the protected western States and may require treatment if a hazardous population of JB develops. At-risk aircraft depart to the protected Western States during the hours of greatest beetle activity, usually between 7 a.m. and 8 p.m.

The at-risk aircraft include all aircraft with a known ultimate destination anywhere in the seven protected States, even if the aircraft transit other airports along the way.

Before the control procedures are needed, train airline and airport personnel in control procedures. Coordinate all training with the State Plant Regulatory Official (SPRO). Know how to apply all Federal and State pesticide regulations.

Initiating the Emergency Action Notification (EAN) and Other Activities

APHIS inspectors may designate any airport within a quarantined State as a regulated airport if they determine that during daylight hours the JB is likely to infest aircraft going to JB-free areas. The distinct possibility that JB-infested aircraft are likely to spread the JB to the seven protected Western States, justifies this regulation.

Issuing the EAN

After determining that an airport is hazardous, the Port Director, an APHIS official, will immediately complete and issue an Emergency Action Notification (Appendix G, PPQ Form 523) to the following individuals:

- The official in charge of the airport
- Officials in charge of airlines sending aircraft during daylight hours to the protected Western States
- The Regional Director responsible for the originating airport
- PPQ personnel responsible for treatments

Using electronic mail, the Regional Director (or a subordinate) will inform the following individuals:

- Chief Operations Officer, Domestic and Emergency Programs, Riverdale, MD
- Other Regional Directors
- All State Plant Regulatory Officials (SPROs) affected by the hazardous conditions
- The State Plant Health Director (SPHD)
- Specialists at the Otis Plant Protection Center

Appendix H contains a list of individuals who should be notified when hazardous conditions exist.

Regulated Airport Report

When an airport is regulated, inform all interested parties by circulating the following report by fax or electronic mail:

Name of Airport	
Date Regulated/Time:	Date—00:00 Hours
Date De-regulated/Time:	Date—00:00 Hours

SPHDs responsible for regulated airports will inform their Regional Directors through the Regional Program Managers of all actions taken. If additional actions are necessary, the SPHDs will notify the Regional Program Managers.

The Regional Directors will then notify the Domestic and Emergency Programs staff of actions taken and airlines involved.

At-Risk Flights

When an airport is regulated, the Port Director (or the PPQ officer) must obtain schedules listing all flights departing during daylight hours for the protected Western States. The Port Director will then distribute these schedules to APHIS personnel and SPROs in the protected Western States.

Unscheduled Flights

When flights are unscheduled, personnel at the originating airport will notify personnel at the destination airport *at least 1 hour before departure of the flight*. This procedure for unscheduled flights is for both commercial and military flights. The Port Director may omit the 1-hour notification requirement on a case-by-case basis. For detailed information, see 301.48-4 para. (d).

Arranging Treatments

To protect the JB-free Western States the Port Directors must implement mitigation procedures at the regulated airports. These procedures may change the airport from regulated to non-regulated.

Once an airport is regulated, the Port Director will inform airline officials that control procedures, which may be treatments, must start as soon as possible. The Port Director will inform the airline officials that PPQ personnel will train the airline personnel for aircraft treatments at the regulated airport.

When airport regulation is likely, the Port Director must contact airline personnel before the start of control procedures to discuss the control procedures and training needs.

Information on control measures is in the following chapter.

Military Cooperation

Authorization for military cooperation is contained in a Joint Armed Forces Directive, *Medical and Agricultural Foreign and Domestic Quarantine Regulations for Vessels, Aircraft, and other Transport of the Armed Forces* (Navy Regulations No. 6210.2; Army Regulations No. 40-12: and Air Force Instruction AFI 48-304).

If a Port Director has any difficulty in obtaining cooperation, the Port Director will call the Commanding Officer's attention to the provisions of Section I, No. 2 of these joint Army-Navy-Air Force regulations.

Cancellation of Emergency Action Notification (EAN)

APHIS inspectors may cancel the regulated status of an airport; this cancellation returns the airport to non-regulated status.

Terminating the Hazardous Condition

PPQ officers will keep their Port Directors informed of JB activity around the airport and in aircraft-operating areas. When the Port Director determines that a hazardous condition no longer exists, the Port Director can change the status of the regulated airport.

Revoking the EAN

When hazardous conditions no longer exist, the Port Director will complete Block 16 of the EAN, Action Taken. As examples, the action taken may be application of treatments or monitoring to detect a fall in the threatening population. Copies of the updated EAN will go to affected airline and airport officials.

The Port Director at the recently deregulated airport will inform the Regional Director through the Regional Program Manager of the revocation of the EAN. Using electronic mail, the Regional Director will notify other Regional Directors, Domestic and Emergency Programs, and State Plant Health Regulatory Officials (SPROs).

Regulated Airport Report

When an airport is deregulated, inform all interested parties by completing and distributing the following report:

Name of Airport	
Date Regulated/Time:	Date—00:00 Hours
Date De-regulated/Time:	Date—00:00 Hours

Monitoring Airports in JB-free Areas

To maintain a JB-free status in the protected Western States, airports in the protected Western States are monitored.

Airport Monitoring

The following methods are often used to monitor airports in JB-free areas, particularly when the airports have repeated interceptions:

- Trapping
- Inspections of at-risk flights from frequently regulated airports

Responding to Interceptions

When a live JB is intercepted in the JB-free area and the origin of the beetle from an infested airport is verified, the SPHD will immediately notify the Port Director of the airport from which the flight originated. The Port Director at the originating airport will intensify monitoring to determine if a hazardous condition exists.

If the aircraft upon which the interception was made transited two or more airports within the regulated States, and the origin of the beetle cannot be verified, the APHIS SPHD must notify Port Directors of all transited airports. The Port Directors of the transited airports will intensify monitoring to determine which of the transited airports are hazardous.

When JBs are found, an EAN may be issued and the aircraft may be treated (or retreated).

At-Risk Flights

When an airport is regulated, the Port Director (or PPQ officer) at a destination airport should receive schedules listing all flights departing during daylight hours for the protected Western States. The Port Director will use these schedules of at-risk flights to plan inspections of arriving flights.

When flights are unscheduled, personnel at the originating airport will notify personnel at the destination airport *at least 1 hour before departure of the flight*. This procedure for unscheduled flights is for both commercial and military flights. The Port Director may omit the 1-hour notification requirement on a case-by-case basis. For detailed information, see 301.48-4 para. (d).

5

Japanese Beetle Program Manual

Control Measures

Contents

Overview

Goal

The ultimate goal of airport control procedures is to prevent the JB from entering aircraft going to the protected Western States.

Methods

To control the JB at infested airports, use the following methods alone or in combination:

- Lowering the JB population to a non-threatening level
- Excluding beetles from the at-risk aircraft
- Treating infested aircraft

Methods that will lower the JB population are the following:

- Applying fast-acting insecticides to host plants to control adults
- Applying insecticides to the soil to control larvae
- Introducing biocontrol agents (however, control may develop slowly, if at all)
- Destroying host plants

The JB population may be lowered throughout the infested airport or only in a portion of the infested airport.

Beetles can be excluded by the following techniques:

- Using physical barriers, such as enclosed walkways
- Scheduling flights when the beetles are not flying (or flying in reduced numbers)
- Changing aircraft-operating areas to areas less attractive to the JB
- Positioning aircraft in ways less attractive to the JB

Currently two insecticides, d-phenothrin and bendiocarb (Ficam® W; Ficam® Plus), are authorized for use on infested aircraft. This chapter contains information on the use of these insecticides.

Depending on the situation, use one or more of the treatments for aircraft and grounds.

Initiating Control

Ideally, control will begin before a JB population reaches a level so hazardous that regulation is required; therefore, control should be both long-range and short-range.

Long-range control will emphasize the establishment of conditions that will keep the JB population below the hazardous level. For example, long-range control will use biocontrol agents, such as the bacterium that causes milky spore disease, to keep JB populations below the hazardous level. As another example, long-range control will use landscape planning at the airport to prevent the planting of host plants near aircraft-operating areas.

Short-range control will emphasize the quick reduction of a population at the hazardous level. For example, a quick-acting soil insecticide will quickly reduce a high population of grubs to a non-threatening level. As another example, foliar treatment of hosts will reduce adult population levels. As a third example, removal of host plants will reduce adult population levels.

Monitoring Results

To monitor the effectiveness of the aircraft and grounds treatments, use one or more of the following means:

- Detections on aircraft at the infested airport
- Detections on aircraft arriving in the JB-free area
- Larval surveys (See **Airport Monitoring and Classification** and **Appendix F**.)
- Adult Visual Surveys (See **Airport Monitoring and Classification**.)
- Trapping (See **Airport Monitoring and Classification**.)

Safety Procedures

Ideally, training of potential applicators should start before hazardous conditions exist.

To protect the health of the applicators and all who could be exposed, all applications of insecticides must follow the recommended Federal and State procedures. For example, safety glasses must be worn when treating baggage and cargo areas.

For additional information and advice on procedures, contact the Otis Plant Protection Center:

Otis Plant Protection Center, Bldg. 1398
Otis ANGB, MA 02542
(508) 563-9303
Fax:(508) 564-4398

Safety Precautions for Aircraft Safety

- Always wear long sleeves and pants.
- Never apply any chemical treatment in the presence of passengers, crew, or animals.
- If treating the passenger compartment, always delay catering until after the treatment.
- Take precautions when applying d-phenothrin aerosols. Have applicators seek fresh air immediately if they feel light-headed or dizzy when applying the aerosol.
- Collect empty pesticide containers; to dispose of containers, follow label directions.
- When applying insecticide, wear safety glasses. Protective gloves and respiratory equipment are recommended but not required.
- After applying insecticide, wash hands before smoking or eating. Never smoke or eat while applying insecticides.

Treatments for Aircraft

Insecticides

Appendix I contains additional information on insecticides and distributors.

Only two insecticides are registered for use on aircraft. One is 10% d-phenothrin which is applied as an aerosol. The other is bendiocarb which is applied as a spray.

Bendiocarb

Sold under the trade name of Ficam® W by Agrevo Environmental Health, Ficam® W is a 76% wettable powder insecticide approved for use on aircraft. Usually used on unloaded cargo aircraft, the bendiocarb solution is applied to areas where the beetles may be found.

The Ficam® Plus formulation is also usable on aircraft. This formulation contains bendiocarb plus pyrethrins and piperonyl butoxide.

For additional information on procedures for use, see the labels in Appendix I.

d-Phenothrin, 10%

The insecticide registered for use as an aerosol on aircraft is 10% (10 percent) d-Phenothrin. Usually, application of this insecticide is either to passenger-carrying aircraft (when unoccupied) or loaded cargo aircraft (when unoccupied).

d-Phenothrin is for use by or under the direction of Federal/State personnel. Only personnel trained by the U.S. Department of Agriculture (USDA) can apply this insecticide. If trained by the USDA, airline personnel can apply this insecticide.

d-phenothrin is available from the Otis Plant Protection Center (see previous page for address) and Niles Plant Protection Center:

Niles Plant Protection Center
2534 South 11th Street
Niles, MI 49120
(616) 683-3563
Fax: (616) 683-9608

With the 10 percent formulation, the rate of application is 8 grams per 1,000 cubic feet. Without an extender, the aerosol can is calibrated to dispense 5 grams per second. Therefore, 8 grams per 1,000 cubic feet will take 1.6 seconds to dispense.

The use of respirators is recommended (but not required).

Calculations for the 10% d-phenothrin Aerosol

To determine the amount of material required to treat an aircraft, first find the cubic capacity and then the seconds of application time.

1. Determine the number of cubic feet in the aircraft.

Information on the volume of commonly-used aircraft is in the PPQ *Treatment Manual* in Section VI; this manual is a USDA-APHIS document.

Information on volume in cubic feet, is also in Appendix J; however, to be absolutely certain of the volumes of the aircraft holds, pay attention to the following note:

NOTICE

Always ask the engineering department or ground crew for information on the volumes of holds, especially when unsure. Aircraft are often altered for various reasons. As an example, extended-range aircraft (ER aircraft) carry additional fuel tanks or larger fuel tanks. This alteration and other alterations change the volume of the holds.

2. Divide the cubic feet present in the aircraft by 1,000 to obtain the units of 1,000 cubic feet. With 10% d-phenothrin, each unit of 1,000 cubic feet will require 8 grams which requires 1.6 seconds of treatment.

Example: If the aircraft cabin has a volume of 10,800 cubic feet, then:

$$\frac{10{,}800}{1{,}000}$$ 10.8 units of 1,000 cubic feet

1.6 seconds x 10.8 = 17.3 = 17seconds of dispensing time

Dispensing d-phenothrin Aerosol

In passenger aircraft with two aisles, it is advantageous to have two individuals dispensing the material at the same time.

When dispensing the aerosol, use a stopwatch, a wristwatch with a second hand, or count aloud using the technique 1001, 1002, etc.

Accurate timing not only insures that the proper amount is dispensed, but also gives a better chance of obtaining an equal distribution.

When applying, keep the dispensing valve fully depressed.

To avoid wetting surfaces, hold the nozzle at least 18 inches away from all surfaces.

TABLE 5-1: Determining the procedure to use for treating *passenger aircraft* compartments

If the compartment is a:	Then:
Lavatory	1. Seal off. 2. Remove beetles.
Cockpit	
Galley	
Cargo Hold	1. Seal off. 2. Spray with d-phenothrin.
Passenger Cabin	1. Seal off. 2. When unoccupied, spray with d-phenothrin.

Never treat passenger compartments when passengers are inside.

Passenger Compartment Procedure—d-phenothrin Aerosol

The Procedure for Treating a Passenger Compartment Treatments will *not* normally be applied in commercial aircraft passenger compartments destined to the protected States.

With slight modification (Step 6), this procedure can be used with military aircraft which will be carrying passengers,

To treat a passenger compartment, use the following procedure:

1. Vacuum clean before treatment.
2. Close cockpit windows. Inspect cockpit area thoroughly and remove any JB found. Keep windows closed until departure. Close cockpit door to prevent aerosol from entering.
3. Close off the galleys with barriers (doors, curtains, plastic sheets, or prefabricated structures) to prevent aerosol particles from entering. Remove any JB found.

Curtains must be full-length to prevent the entrance of aerosol particles into the galley. If the curtains are not full-length, use other means to seal the entrance. Airlines should provide materials, such as polyethylene, to seal galley areas.

4. Outside of the galley areas, cover the following items with an impervious material (such as polyethylene):
   - ❖ Water fountains
   - ❖ Beverage and food preparation surfaces
   - ❖ Exposed oxygen masks
5. Open doors to lavatories and carefully inspect lavatories. Remove any JB found then close lavatory doors.
6. Check aisles and remove all obstacles.
7. Put on safety glasses (and respirator, if desired).
8. Stop all aircraft ventilation systems prior to treatment. Arrange to keep the ventilation system off for 10 minutes after the treatment.
9. Close aircraft entrance doors.
10. Start (perhaps with another applicator) 10 feet from the end of the aircraft. While backing slowly through the aircraft, dispense aerosol in a sweeping motion with cans pointing upward at a 45° angle. Do not spray any closer than 18 inches to any object.
11. Close all doors after exiting and keep the aircraft closed for 15 minutes post-treatment.
12. After the 15-minute post-treatment period, start the aircraft ventilation system. Ventilate the aircraft for 15 minutes before boarding passengers, crew, or ground personnel. If aerosol particles are still noted in the air after the 15-minute ventilation period, the aeration should continue until the particles disappear. With most ground air-conditioned trucks a complete air change can occur within 3 to 5 minutes.

The individual who starts the ventilation equipment must wear safety glasses.

Some military aircraft (used to carry passengers) do not have a ventilation system other than a forced air system when in flight. If the military aircraft do not have a ventilation system, treatment well before use is desirable.

After treatment, safeguard the aircraft until departure.

Post-treatment Cleanup Procedure for d-phenothrin Aerosol

1. Do not remove barriers from galleys until catering is completed; beetles can enter during the catering process.
2. Do not open cockpit doors.

3. Sweep after treatment; *never* vacuum.
4. If lavatory doors were left open during treatment, wipe the seat surfaces with a clean, damp cloth and discard exposed facial tissue and soap.
5. Remove covers used to protect specific items outside the galley (for example, drinking fountains).
6. After the cleanup, have all applicators wash their hands, faces, and arms thoroughly before smoking, eating, or drinking.

Maintaining a Pest-Free Condition

After treatment of a passenger compartment, keep the aircraft JB-free by the following procedures:

- Monitor the entrance to the aircraft to determine if beetles are entering.
- Use enclosed walkways to board passengers either from the terminal or from the vehicles that carry passengers to the aircraft.
- Remove any beetles that enter the aircraft and destroy them.
- Keep the barrier (closure, curtain, or door) from the galley to the inside of the aircraft closed until after catering. After catering, thoroughly inspect for beetles in the galley area.

When airline personnel notice an exceptionally heavy population of beetles, they should notify a PPQ officer who will determine what further measures are necessary.

Treating Loaded and Unloaded Cargo Aircraft

Whenever possible, treat cargo aircraft before loading. Treatment before loading allows penetration of the insecticide to cargo areas and nooks that become inaccessible after loading. Treatment before loading is desirable, particularly when JB-free cargo will be loaded.

TABLE 5-2: Decision table for determining the procedure to use for treating *cargo aircraft* compartments.

If the Compartment Is a:	And:	Then:
Lavatory	→	1. Seal off. 2. Remove beetles.
Cockpit		
Galley		
Cargo hold	Unloaded *and* cargo is to be carried	1. Seal off. 2. Treat with bendiocarb *or* spray with d-phenothrin.
	Unloaded *and* personnel (and cargo) are to be carried	1. Seal off. 2. Treat with bendiocarb *or* spray with d-phenothrin when unoccupied.
	Loaded with cargo	1. Seal off. 2. Spray with d-phenothrin.
Cockpit	→	1. Seal off. 2. Remove beetles.
Galley	→	1. Seal off. 2. Remove beetles.

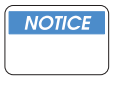
Treating Unloaded Cargo Aircraft with Bendiocarb

To treat unloaded cargo aircraft with bendiocarb, use the following procedure:

1. Clean the aircraft if needed.
2. Cover sensitive equipment in the cargo hold.
3. Put on safety glasses (and respirator, if desired).
4. Treat all vertical surfaces, 1 foot above the horizontal surfaces.
5. Treat all horizontal surfaces starting from within the cargo area and working towards the hatch.
6. Treat the ball-matt area (the area where the cargo first enters the aircraft).

Treating Loaded Cargo Aircraft with d-phenothrin Aerosol

Loaded aircraft that stand open during the day must be treated, regardless of loading time. Beetles often fly into and remain in open aircraft. Use the following procedures to treat loaded aircraft.



Cover all sensitive equipment that will be exposed to the d-phenothrin aerosol.

NOTICE

Military (and other) cargo is often stored outside on pallets for lengthy periods. Beetles often rest overnight on the cargo pallets. Loading the aircraft with JB-infested pallets will infest the aircraft. Therefore, be sure to treat the holds of aircraft that contain cargo pallets that have been stored outside and are likely to be JB-infested. After treatment, remove all JBs.

Procedures for Treating Loaded Baggage/ Cargo Holds with Aerosol

Two procedures are available for treating loaded baggage/cargo holds in aircraft carrying passengers or cargo. These are the recommended procedures when treating holds after loading cargo and baggage. When treatment is done after loading, do not deduct space occupied by cargo and baggage. If animals are not being shipped, aeration is not required in the luggage compartments of passenger aircraft.

Selection of the correct procedure depends on whether or not live animals are being shipped. The two procedures follow.

Treating Baggage/Cargo Holds With Live Animals Being Shipped

To treat a baggage/cargo hold when live animals, such as pets, will be shipped, use the following procedure:

1. Remove the live animals before treatment.
2. Put on safety glasses (and respirator, if desired).
3. Treat the baggage/cargo hold.
4. Keep baggage/cargo hold closed for 15 minutes.
5. Open the hold door(s); use a mechanical barrier to protect the treated hold.
6. Aerate the baggage/cargo hold for 15 minutes.
7. Reload the animals.
8. Close hold door(s).

Treating Baggage/Cargo Holds Without Live Animals Being Shipped

To treat a loaded baggage/cargo hold without live animals being shipped, use the following procedure:

1. Visually inspect baggage/cargo hold before loading, collecting and destroying all JB found.
2. Visually inspect all baggage or cargo as it is being loaded. The loading will take place prior to treatm0ent.

3. Calculate the rate. Use the same rate and procedures followed for baggage/cargo areas as cargo areas. Do not deduct the space occupied by baggage and cargo in computing the required treatment rate.
4. Put on safety glasses (and respirator, if desired).
5. Dispense the insecticide. In small holds, open the hatch just enough to allow a hand and the aerosol container inside; as an alternative, apply through open porthole, if available, in the hatch. Many holds are small; therefore, applicators may treat these small areas by standing at the hatch and directing the spray either aft or forward.

After treatment, close the hatch immediately. Unless animals are to be loaded, aerating the holds is not necessary.

Treating Unloaded Baggage/Cargo Pods

To treat unloaded baggage/cargo pods with d-phenothrin aerosol, use the following procedure:

1. Select pods that are in good repair and without hand holes, so that the pods are relatively air tight.
2. Put on safety glasses (and respirator, if desired).
3. Slightly open the pod door.
4. Spray for 1 second.
5. Keep pod closed for 15 minutes.
6. Open and aerate the pod for 15 minutes.
7. Load baggage or cargo and close pod.

Precautions for Aircraft Transiting Hazardous Airports

The following precautions must be used for aircraft transiting hazardous airports:

- Use enclosed walkways to board passengers. Always keep the enclosed walkway tight against the aircraft.
- Keep cockpit windows closed.
- Seal off the galley(s) if the aircraft is to be catered at the hazardous airport. Inspect galleys after catering but before removing barriers separating the galleys from the cabins.
- Keep cargo holds closed except during loading and unloading.

Timing an Insecticide Application

When operating under the following conditions, aircraft *may not* require treatment:

- When arriving and leaving during the same night
- On cool days below 73° F (23° C)
- On hot days above 104° F (40° C)
- On windy days
- On rainy days

However, even under the conditions mentioned above, the treatment of aircraft may be necessary. Beetles often fly when the temperature is high, when the temperature is low, or when the day is windy. On rainy days, JB may infest cargo stored outside. Therefore, based on a case-by-case evaluation of the situation, the Port Director will decide whether or not to treat at-risk aircraft.

Treat aircraft no more than 1 hour before loading.

PPQ Form 250 - Aircraft Clearance or Safeguard Order

If requested by personnel at the destination airport, issue an Aircraft Clearance or Safeguard Order to the pilot after treating an aircraft. However, if personnel at the destination airport do not request an Aircraft Clearance or Safeguard Order, do not issue the document.

Appendix K shows PPQ Form 250, Aircraft Clearance or Safeguard Order.

Exclusion Devices

In certain situations, exclusion devices will prevent the entry of beetles into aircraft.

Passengers

Exclusion devices physically exclude beetles from the cargo, baggage, or passenger compartments of aircraft. Examples of exclusion devices are enclosed walkways and bus-type vehicles for the loading and unloading of passengers. When used, the exclusion devices must fit tightly against the aircraft.

When passenger exclusion devices are used, after the passengers have boarded, thoroughly inspect the passenger entrance to within 10 feet of the openings. Within the aircraft, pay special attention to the floor and window sills. Remove any beetles found from the aircraft.

Cargo

Enclosed ramps for cargo aircraft have been developed by companies faced with a JB entry problem; however, few enclosed ramps are in use.

General Information on Exclusion Devices

Use exclusion devices whenever possible. Even if JBs enter the aircraft, the numbers entering and likely to cause trouble will be very small.

Because beetles tend to closely follow the sunny side of a fuselage, they can often be excluded by "boots," exclusion devices that frame open doors. When the beetles encounter boots, they tend to drop below the open doors. Information on the construction of these boots is available from Win McLane, USDA-APHIS, Otis Plant Protection Center (508-563-9303 ext. 215).

Exclusion devices can only be used when aircraft are JB-free. Do not use exclusion devices on aircraft parked at a regulated airport for cleaning or other purposes, which require exterior doors to remain open, until the aircraft are treated with an insecticide.

When exclusion devices are used, protect all openings in the aircraft from 7 a.m. to 8 p.m.

Selecting Aircraft-Operating Areas

Certain aircraft-operating areas are much more likely to attract JBs than other areas. Avoid the following aircraft-operating areas which are attractive to the JB:

- Close to moist grassy areas on light-textured soil which are favorable for egg-laying and larval development
- Close to feeding hosts for the adult beetles
- Possessing a favored sunny exposure

If areas attractive to JBs are used for aircraft operations, especially during the hours of greatest beetle activity, aircraft entries are likely.

If possible, loading areas that are less attractive to beetles should be used. Characteristics of less-attractive aircraft-operating areas are as follows:

- Isolated from areas favorable for egg-laying and larval development
- Devoid of hosts for the beetle
- Shaded rather than sunny

Positioning of Aircraft

If possible, aircraft should be positioned so that the aircraft or, at least, its doors are in the shade. Beetles prefer sunny locations and are more likely to enter if doors and hatches are exposed to the sun.

Stand-by Aircraft

The stand-by aircraft that replace aircraft on scheduled flights must be JB-free. “Tail-swapping” is the term for the replacement of one aircraft by another. When “tail-swapping” occurs, the stand-by aircraft may require treatment and safeguarding so that they are JB-free.

Treatments of Airport Grounds

Additional information on insecticides and distributors may be found in **Appendix I**.

Treatments for Larvae

Chemical Control of Larvae

The major advantage of treating larvae (grubs) in the soil is the destruction of the grubs before they become adult beetles. The major disadvantage is the considerable expense for materials and labor.

Biological Control (Biocontrol) of Larvae

The major advantage of biological control is the possibility of long-term reduction of the JB population to a non-threatening level. The major disadvantages are (1) long-term control may be slowly developed and (2) significant long-term control may not develop.

The various potential biocontrol organisms are not available at all times; suppliers of the organisms tend to come and go.

With varying degrees of success, the following organisms are used for biocontrol of the JB larvae:

◆ *Bacillus popilliae*	Bacterium causing milky spore disease
◆ *B. thuringiensis* (Bt)	Bt strain for the JB grub
◆ *Heterorhabditis bacteriophora*	A nematode effective against JB grubs
◆ *Steinernema* glaseri	A nematode effective against JB grubs
◆ *Tiphia vernalis*	A small wasp parasitic on the JB grub

Biocontrol agents against the larvae can be used with the biocontrol agent against the adults.

Treatments for Adults

Chemical Control of Adults

The major advantage of treating the adults (beetles) by fast-acting chemicals is a quick reduction in the adult population. The major disadvantage is that often the adults destroyed are quickly replaced by adults emerging after the treatment.

Biological Control of Adults

The solitary fly *Istocheta aldrichi* is an internal parasite of the adult JB. The female flies deposit up to 100 eggs during a period of about 2 weeks. Usually laid upon the thorax of the female beetles, the eggs hatch into maggots which bore directly into the bodies of the hosts killing the beetles. In ideal situations, this fly can suppress JB populations before the beetles can reproduce.

Mass Trapping of Adults

The major advantage of mass trapping adults is a fairly quick reduction in the JB population threatening aircraft. The major disadvantage is that mass trapping in the airport may attract JBs into the airport, intensifying rather than solving the JB problem. Another disadvantage is the cost of the mass trapping in work hours and expenses.

Removal / Reduction of Host Plants

The major advantages of removing host plants are (1) a quick reduction in the JB population threatening aircraft is often obtained and (2) long-term control is achieved by removing host plants. The major disadvantages are the aesthetic loss and environmental damage.

Appendix A

Non-preferred Hosts and Non-hosts

The Japanese beetle (JB) feeds sparingly or not at all on the following plants:

Small Fruits	American cranberry, black huckleberry, European gooseberry, northern dewberry, northern gooseberry
Orchard Fruits	Pear, persimmon
Truck and Garden Crops	Artichoke, brussel sprouts, cabbage, cantaloupe, cauliflower, celery, onion, cucumber, eggplant, endive, carrot, pea, radish, kale, leak, lettuce, muskmelon, parsley, parsnip, peanut, potato, pumpkin, red pepper, rutabaga, salsify, spinach, summer squash, sweet potato, tomato, turnip, watermelon
Field Crops	Barley, buckwheat, hops, millet, oats, rye, timothy, tobacco, vetch, wheat

Ornamental Herbs	Adam's needle yucca, ageratum, American columbine, American germander, American pennyroyal, American waterlily, American wormseed, anise, babysbreath, bearded iris, begonia, blue false-indigo, brown-eyed-susan, butterfly violet, caladium, carnation, catnip, Chile avens, Chinese lantern-plant, Christmas-rose, chufa, cockscomb, bamboo, cosmos, mignonette, portulaca, coneflower, coralbells, cornflower, gysophila, dogtooth violet, dusty-miller, Easter lily, European columbine, evergreen candytuft, false-dragonhead, flowering tobacco, forget-me-not, foxglove, fringed iris, gaillardia, balsam, nasturtium, petunia, verbena, goldenglow, ground-myrtle, hardy larkspur, hyssop, Iceland poppy, Japanese iris, Japanese spurge, lance coreopsis, lily-of-the-valley, mountain-bluet, motherwort, mullein, New England aster, oriental poppy, oswego-tea, oxeye daisy, Pacific bleedingheart, pampas grass, pansy, perennial pea, phlox, purple loosestrife, pyrethrum, lily, sedum, skydrop aster, small white aster, snapdragon, southern maidenhair, fern, spearmint, speedwell, spiderwort, strawflower, sweetpea, sweet scabious, sweet violet, sweet-william, tawny daylily, tiger lily, Virginia dayflower, wandering-Jew, wave aster, White-top, white turtlehead, wild bergamot.
Ornamental Shrubs and Vines	American bittersweet, American bladdernut, American elder, American holly, beautyberry, border forsythia, Canada yew, Carolina allspice, Catawba rhododendron, Chinese azalea, Chinese holly, Chinese redbud, climbing euonymus, climbing hydrangea, lilac, privet, coralberry, English holly, English ivy, European cranberry bush, firethorn, gardenia, groundsel-bush, Japanese holly, Japanese honeysuckle, lantana, mockorange, mountain-laurel, matrimonyvine, panicle hydrangea, Persian lilac, pinxterbloom, azalea, rosebay rhododendron, smooth hydrangea, snowberry, swamp azalea, sweet autumn clematis, torch azalea, tubeclematis, weeping forsythia, winged euonymus, winterberry, winter honeysuckle, witchhazel.
Trees	Ailanthus, Atlantic white-cedar, American arborvitae, American hazelnut, American sweetgum, balsam fir, black locust, black oak, Bolleana poplar, boxelder, butternut, Canada yew, Chinese juniper, common juniper, common smoketree, cryptomeria, Douglas fir, English yew, flowering dogwood, hemlock, Hinoki-cypress, Japanese pagodatree, Japanese yew, laurel magnolia, Lawson whitecedar, maidenhair tree, mimosa, northern red oak, Norway spruce, Oriental arborvitae, pignut hickory, post oak, red ash, red maple, red mulberry, saucer magnolia, Sawara-cypress, scarlet oak, Scotch pine, shagbark hickory, silver maple, southern magnolia, southern red oak, tuliptree, Virginia pine, western yew, white ash, white oak, white poplar.

B

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Appendix B

Current Distribution of the Japanese Beetle

States in U.S. Entirely Infested

The following States are entirely infested:

States	Abbreviated
Connecticut	CT
Delaware	DE
District of Columbia	DC
Indiana	IN
Illinois	IL
Kentucky	KY
Maryland	MD
Massachusetts	MA
New Hampshire	NH
New Jersey	NJ
New York	NY
North Carolina	NC
Ohio	OH
Pennsylvania	PA
Rhode Island	RI
South Carolina	SC
Vermont	VT
Virginia	VA
West Virginia	WV

States in U.S. Partially Infested

The following States are partially infested. The States are listed in alphabetical order with their infested and non-infested counties following.

TABLE B-1: List of Partially Infested Areas

State	Infested Counties			Non-Infested Counties
Alabama (AL)	Blount Calhoun Chambers Cherokee Chilton Clay Cleburne Coosa Cullman DeKalb Elmore Etowah Franklin Jackson Jefferson Lee	Limestone Macon Madison Marion Marshall Montgomery Morgan Randolph Saint Clair Shelby Talladega Tallapoosa Tuscaloosa Walker Winston		All other counties
Georgia (GA)	Baldwin Banks Barrow Bartow Bibb Burke Butts Carroll Catoosa Chatham Chattahoosee Chattooga Cherokee Clarke Clayton Cobb Columbia Coweta Crawford Crisp Dade Dawson DeKalb Douglas Elbert Fannin Fayette Floyd Forsyth Franklin Fulton	Gilmer Glascock Gordon Greene Gwinnett Habersham Hall Hancock Haralson Harris Hart Heard Henry Houston Jackson Jasper Jefferson Jones Lamar Lincoln Lumpkin McDuffie Macon Madison Marion Meriwether Monroe MorganMurray Muscogee Newton Oconee	Oglethorpe Paulding Peach Pickens Pike Polk Putnam Rabun Richmond Rockdale Schley Spaulding Stephens Talbot Taliferro Taylor Towns Troup Twiggs Union Upson Walker Walton Ware Warren Washington White Whitfield Wilkes Wilkinson	All other counties
Iowa (IA)	Scott			All other counties

TABLE B-1: List of Partially Infested Areas

State	Infested Counties		Non-Infested Counties
Kansas (KS)	(But being eradicated) Crawford Johnson Sedgwick Shawnee Wyandotte		All other counties
Maine			Aroostook Washington
Michigan	Allegan Barry Berrien Branch Calhoun Cass Claire Clinton Eaton Genesee Hillsdale Ingham Ionia Jackson Kalamazoo Kent Lake	Lapeer Lenawee Livingston Macomb Mason Monroe Muskegon Oakland Oceana Ottawa Saginaw Shiawassee St. Clair St. Joseph Van Buren Wastensaw Wayne	All other counties
Minnesota	Carver Dakota Hennepin Ramsey Scott		All other counties
Missouri	Clay Franklin Jackson Platte Stone St. Louis St. Louis City		All other counties
Nebraska	Douglas Lancaster		All other counties
Oklahoma	Cherokee Oklahoma Tulsa		All other counties

TABLE B-1: List of Partially Infested Areas

State	Infested Counties			Non-Infested Counties
Tennessee	Anderson Bedford Bledsoe Blount Bradely Campbell Cannon Carter Cheatham Claiborne Clay Cocke Coffee Crockett Cumberland Davidson DeKalb Dickson Fentress Franklin Giles Grainger Greene Grundy	Hamblen Hamilton Hancock Hawkins Henry Hickman Houston Humphreys Jackson Jefferson Johnson Knox Lawrence Lincoln Loudon Macon Marion Marshall Maury McMinn Meigs Monroe Montgomery Moore	Morgan Overton Pickett Polk Putman Rhea Roane Robertson Rutherford Scott Sequatchie Sevier Smith Stewart Sullivan Sumner Trousdale Unicoi Union Van Buren Warren Washington White Williamson Wilson	All other counties
Wisconsin	Dane Door EauClaire Kenosha Milwaukee Ozaukee Portage Racine Rock Sheboygan Walworth Waukesha Wood			All other counties

States in U.S. Non-infested

Non-infested States: The following States are entirely non-infested:

States	Abbreviated
Alska	AL
Arizona	AZ
Arkansas	AR
California	CA
Colorado	CO
Florida	FL
Hawaii	HI
Idado	ID
Lousisana	LA
Mississippi	MS
Montana	MT
Nevada	NV
New Mexico	NM
North Dakota	ND
Oregon	OR
South Dakota	SD
Texas	TX
Utah	UT
Wyoming	WY

Provinces in Canada Partially Infested

The following list contains the partially infested Provinces in Canada in alphabetical order. These Provinces are followed by their infested and non-infested regional municipalities (RMs), which are generally equivalent to the counties in the United States.

Province	Infested Regional Municipalities	Non-infested Regional Municipalities
Ontario	Niagara RM Hamilton-Wentworth RM Haldimand-Norfolk RM	All other RMs
Quebec	Brome-Missisquoi RM Bas-Richelieu RM Champlain RM Le Haut Richelieu RM Rousillion RM	All other RMs

Provinces in Canada Non-infested

The following Provinces are entirely non-infested:

Provinces	Abbreviated
Alberta	ALTA
Britsh Columiba	BC
Manitoba	MAN
New Brunswick	NB
Newfoundland	NFLD
Northwest Territories	NWT
Nova Scotia	NS
Prince Edward Island	PEI
Saskatchewan	SASK
Yukon	YK

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Appendix C

Current Map Showing JB Distribution

APHIS-PPQ-JB Map

The current map that shows the distribution of the JB is part of the Japanese Beetle Program Manual. Domestic and Emergency Programs is responsible for preparing this map.

A current copy of the JB Distribution Map is available at the following website:

http://www.aphis.usda.gov/ppq/maps/jbmap.html

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Japanese Beetle Program Manual

Appendix D

Compliance Agreement

A blank copy of the form for a Compliance Agreement, PPQ Form 519, is on the following page.

FORM APPROVED OMB NUMBER 0579-0054

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE

COMPLIANCE AGREEMENT

Public reporting burden for this collection of information is estimated to average 1.25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the form. Send comments regarding this burden estimate or any other aspects of thiscollection of information, including suggestions for reducing the burden, to USDA, OIRM, Clearance Officer, Room 404-W, Washington, DC 20250. When replying refer to the OMB number and Form Number in your letter.

1. NAME AND MAILING ADDRESS OF PERSON OR FIRM	2. LOCATION
,	,

3. REGULATED ARTICLE(S)

4. APPLICABLE FEDERAL QUARANTINE(S) OR REGULATIONS

5. I/We agree to the following:

6. SIGNATURE	7. TITLE	8. DATE SIGNED
		9. AGREEMENT NO.
The affixing of the signatures below will validate this agreement which shall remain in effect until canceled, but may be revised as necessary or revoked for noncompliance.		10. DATE OF AGREEMENT

11. PPQ OFFICIAL *(Name and Title)*	12. ADDRESS
13. SIGNATURE	
14. STATE AGENCY OFFICIAL *(Name and Title)*	15. ADDRESS
16. SIGNATURE	

FIGURE D-1: PPQ Form 519—Compliance Agreement

Appendix E

Trap and Lure Distributors

References

Additional information on the efficiency of various traps can be found in the following publications:

Alm, S., Yeh, T., Dawson, C., and Klein, M. 1996. Evaluation of trapped beetle repellency, trap height, and string pheromone dispensers on Japanese beetle captures (Coleoptera: Scarabaeidae). *Environ. Entomol.* 25(6):1274-1278.

Alm, S., Yeh, T., Campo, M., Dawson, C., and Jenkins, E., and Simeoni, A. 1994. Modified trap designs and heights for increased captures of Japanese beetle adults (Coleoptera: Scarabaeidae). *J. Econ. Entomol.* 87:775-780.

Klostermeyer, Lyle E. 1985. Japanese beetle (Coleoptera: Scarabaeidae) traps: Comparison of commercial and homemade traps. *J. Econ. Entomol.* 78:454-459.

McLane, W., Finney, J., and Ladd, T. 1987. Evaluation of traps and other techniques for controlling Japanese beetles in and around airports and nurseries. 1987 Progress Report, Otis Methods Development Center, Animal and Plant Health Inspection Service, United States Department of Agriculture. Pg. 162-182.

Trap Coordinator

USDA-APHIS employees can obtain Japanese Beetle traps from the following source:

Martha Garza
Trap Coordinator
USDA/APHIS/PPQ/RMSS
Facility Management Section
Moore Air Base
Route 3, Building 6017
Edinburg, Texas 78539

Telephone: (956) 580-7222
Fax: (956) 580-7325

Distributors

A current list of distributors is difficult to maintain, because often companies change names, change inventories, merge, or fail. Therefore, do not consider this list to be a complete list. This list is presented only to give an idea of what is available.

Biocontrol Network

5116 Williamsburg Road
Brentwood, TN 37027

Telephone: (800) 441-2847
Telephone: (615) 370-4301
Fax: (615) 370-0662
Website: http://www.biconet.com

Traps:
1. Safer Japanese Beetle traps
2. Tanglefoot Japanese Beetle traps

Gardener's Supply

128 Intervale Road
Burlington, VT 05401-2850

Telephone: (888) 833-1412
Website: http://www.gardeners.com

Trap: Catch-Can Japanese Beetle Trap
Lure: Double lure system
Comments: Bait lasts one season

Gardens Alive

5100 Schenley Blvd.
Lawrenceburg, IN 47025

Telephone: (812) 537-8650
Fax: (812) 537-5108
Website: http://www.gardens-alive.com

Traps:
1. Heavy-plastic Japanese Beetle Trap (possibly Catch-Can)
2. Yellow-plastic Japanese Beetle trap with disposable plastic tray bag

Lure: Double lure system
Comments: Also sells Trece Japanese Beetle Trap with double lure

Great Lakes IPM

10220 Church Road, NE
Vestaburg, MI 48891

Telephone: (989) 268-5693; 268-5911
Website: http://www.greatlakesipm.com
Fax: (989) 268-5311
E-mail: glipm@nethawk.com

Traps:
1. Trece Catch-Can)
2. Japanese Beetle Bag Trap Kit

Lure: Double lure system
Comments: Kits for the complete traps plus bait are available.

Hercon Environmental Products

Hercon Laboratories Corporation
P.O. Box 435 Aberdeen Road
Emigsville, PA 17318-0435

Telephone: (717) 764-1192
Fax: (717) 767-1016

Trap: Lure-N-Kill JB trap
Lure: Hercon Floratape, 3:7:3 PEP + eugenol + geraniol, Hercon Luretape with Japonilure 0.47%
Comments: The Lure-N-Kill JB trap has performed on par with the Ellisco Trap when dual lure was used. The container capacity of the Lure-N-Kill trap is 3.75 liters.

Snow Pond Farm Supply

699 Adams Street
P.O. Box 115
North Abington, MA 02351

Telephone: 781-878-5581
Fax: 781-878-5582
Website: www.snow-pond.com
E-Mail: sales@snow-pond.com
info@snow-pond.com
support@snow-pond.com

Trap: Japanese beetle trap (Catch-Can)
Lure: Double lure system
Comments: Trap is designed to last for many seasons instead of being a “throwaway” trap.

Sterling International

Sterling International, Inc.
Pest Control Products
3808 N. Sullivan Road, Bldg 16BV
Spokane, WA 99216-1616

Telephone: (800) 666-6766
Fax: (509) 928-7313
Website: http://www.rescue.com

Trap: Rescue® Japanese Beetle Trap
Lure: Double lure system
Comments: Available by the case. Contact Ann Beardon, Customer Service.

Suterra LLC

213 S. W. Columbia Street
Bend, OR 97702

Telephone: (866) 326-6737
Fax: (541) 388-3705
Website: http://www.suterra.com

Lure: BioLure®

The Tanglefoot Company

314 Straight Avenue, SW
Grand Rapid, MI 49504-6485

Telephone: (616) 459-4139
Fax: (616) 459-4140
Website: http://www.tanglefoot.com
Email: tnglfoot@aol.com

Traps:
1. Xpando traps
2. TBC traps

Lure: Double lure system

Trece Incorporated

P.O. Box 6278
1031-C Industrial Street
Salinas, CA 93912-4541

Telephone:(831) 758-0204
Fax: (831) 758-2625
Website: http://www.trece.com

Trap: Japanese Beetle Xpando Trap
Lure: Double-Lure System

NOTICE

Traps can be made from large plastic milk jugs; these traps with dual lures are as efficient as the commercial traps mentioned above.

U-Spray, Incorporated

4653 Highway 78
Lilburn, GA 30047

Telephone: (770) 985-9388
Fax: (770) 985-9319 (or if ordering (800) 800-1770)
Website: http://www.bugspray.com

Trap: SureFire Japanese Beetle Trap
Lure: JB bait
Comments: Offers other products to control Japanese beetle.

Woodstream Corporation

P.O. Box 327
69 N. Locust Street
Lititz, PA 17543-0327

Telephone: (800) 800-1819 or (717) 626-2125
Fax: (717) 626-1912 (If ordering 800-800-1770)
Website: http://www.woodstreamcorp.com/
Email: consumercare@woodstream.com

Trap: Safer Japanese Beetle Trap (70102)
Comments: Purchased SureFire/Safer products

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Appendix F

A Technique for Larval Surveys

Need for Larval Survey

When only larvae are present, a rapid and accurate method is desirable for estimating population density. The method must be able to classify populations into those which need control and those that do not.

This Appendix describes a sequential sampling plan in which the number of samples to be taken is not fixed; the required number of samples is determined by the cumulative total from the initial samples.

Larval Stage Requirement

This sampling plan is for 2nd instar populations of JB. According to Vittum (1986), a population will be almost completely 2nd instar around the last day of August in New England (about 1 month after the midpoint of the flight period). Sampling was done in August in New Jersey.

Size of Sample

Each sample consists of 1 square foot (sq ft) of turf collected and examined for larvae to a depth of 4 to 5 inches.

Time Requirement

The time required to examine one sample is brief, around 15 minutes.

Control Threshold

Control of the 2nd-instars of JB is recommended when the average larval count is greater than 3 per sq ft; control is not required when the count is less than 1 per sq ft.

Using Table 1 on the next page, sampling should cease when the cumulative number of larvae falls within the category of “treatment not required” or “treatment required.”

Additional Information

Additional information can be found in the following publication:

Ng, Y. S., Trout, J. R., and Ahmad, S. 1983. Sequential sampling plans for larval populations of the Japanese beetle (Coleoptera: Scarabaeidae) in turfgrass. *J. Econ. Entomol.* 76:251-253

Table 1. Sequential sampling table for treatment decisions on 2nd instars of the JB larvae in turfgrass

TABLE F-1: Sequential sampling table for treatment decisions on 2nd instars of the JB larvae in turfgrass

CUMULATIVE NUMBER OF LARVAE				
	10 Percent Error Rate		5 Percent Error Rate	
No. of Samples	Treatment not Required	Treatment Required	Treatment not Required	Treatment Required
1	[1]	6	[1]	7
2	[1]	8	[1]	9
3	1	9	[1]	11
4	3	11	1	13
5	4	13	3	14
6	6	15	5	16
7	8	16	6	18
8	10	18	8	20
9	11	20	10	21
10	13	22	12	23
11	15	23	13	25
12	16	25	15	26
13	18	27	17	28
14	20	28	18	30
15	22	30	20	32
16	23	32	22	33
17	25	34	24	35
18	27	35	25	37
19	29	37	27	39
20	30	39	29	40

1 Decision cannot be reached.

Appendix G

PPQ Form 523 Emergency Action Notification (EAN)

Use of the EAN

Use the Emergency Action Notification (EAN; PPQ Form 523) when either of the following conditions occurs:

- When a JB-infested aircraft is intercepted at an airport in the JB-free States
- When aircraft leaving an airport in the JB-infested area are likely to be JB-infested

When the first condition occurs, use the EAN to obtain treatment of the infested aircraft.

When the second conditions occurs, use the EAN to regulate the hazardous airport.

Appendix H

Japanese Beetle Notification List

The following individuals (or institutions) in the non-infested States must be notified of situations that threaten their JB-free status.

Arizona

Arizona Department of Agriculture
Cherry Chandler
(602) 542-0955
Fax: (602) 542-1004
or
Ahmed Nasser
(602) 542-3308
Fax: (602) 542-1004

USDA-APHIS
Carlos Bejarano, PPQ Officer
(602) 379-4028
Fax: (602) 379-6007

California

California Department of Agriculture
Aurelio Posadas
(916) 654-1211
Fax: (916) 654-0555

USDA-APHIS
Dan Hamon, Port Director
(916) 857-6258
Fax.: (916) 857-6266

Idaho

Idaho Department of Agriculture
Dr. Roger Vega
(208) 334-2986
Fax: (208) 334-2283

USDA-APHIS
Acting State Plant Health Director
(208) 733-5119
Fax: (208) 734-7863

Nevada

Nevada Department of Agriculture
Bob Gronowski
(775) 688-1180
Fax: (775) 688-1178

USDA-APHIS
Dan Kail, State Plant Health Director
(775) 784-5701
Fax: (775) 784-5468

Oregon

Oregon Department of Agriculture
Alan Mudge
(503) 986-4665
Fax: (503) 986-4786

USDA-APHIS
Gary Carpenter, State Plant Health Director
(503) 326-2814
Fax: (503) 326-2969

Utah

Utah Department of Agriculture
Ed Bianco, State Entomologist
(801) 538-7184
Fax: (801) 538-7189

USDA-APHIS
Robert King, State Plant Health Director
(801) 975-3310
Fax: (801) 975-3313

Washington

Washington State Department of Agriculture
Chad Phillips
(360) 586-8956
Fax: (360) 586-8509

USDA-APHIS
Linda Stark, Operations Support Officer
(206) 764-3182
Fax: (206) 764-3187

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Japanese Beetle Program Manual

Appendix I

Insecticide Information and Distributors

Disclaimer

This Appendix supplies additional information about the various insecticides used to control the JB stages. Mention of these products and companies is not to be considered an endorsement. These products and companies are mentioned merely as a convenience.

As a safety precaution, read and follow all label directions.

Besides label directions, follow all pertinent State and Federal laws.

Distributors

Agrevo Environmental Health

AgrEvo USA Company
95 Chestnut Ridge Road
Montvale, NJ 07645-1801
(800) 331-2867
(201) 307-9700
Website: http://www.agrevo.com

Adult Insecticide: Bendiocarb is the active ingredient in Ficam® W, a 76% Wettable Powder.

Comments: Bendiocarb is one of two insecticides authorized for control of the adult JB in aircraft.

Dow Agro Sciences

P. O. Box 681428
9330 Zionsville Road
Indianapolis, IN 46268-1189
(800) 255-3726
(317) 337-3000
Website: http://www.dowagro.com

Larval Insecticide: Chlorpyrifos is the active ingredient in Dursban™ Pro, a formulation designed as a spray for turf pests. The recommended dosage is 3 to 6 fluid ounces per 1000 ft^2. Chlorpyrifos in Dursban™ 50W is a wettable powder formulation used at the rate of 4 to 8 lb/a for turf.

Comments: According to Villani and coworkers (1988; *J. Econ. Entomol.* 81:785-788) chlorpyrifos, applied as Dursban™ 50% wettable powder at 1.5 lb/a, give effective control (91%) for JB grubs. According to Moore (1980; *Insecticide and Acaricide Tests* 5:197), Dursban™ 2E at 4.0 lb/a gave effective control (around 90%) 1 year and moderate control (69%) the next year.

As a root ball dip, see the following website:

http://www.aphis.vision.gov/npb/rootball.thml

In addition, Win McLane states that a chlorpyrifos rate of 1 pound per 100 galls is effective.

Bayer Products, Inc.

8400 Hawthorn Road
Kansas City, MO 64120-0013
(800) 842-8020

Website: http://www.protect-your-turf.com

Larval Insecticide: Imidacloprid is the active ingredient in Merit® 0.5G and Merit® WSP.

Comments: Both the Merit® 0.5G and Merit® WSP are for the control of soil-inhabiting pests of turfgrass, such as the larvae of the Japanese beetle. High levels of control are possible when applications are made preceding or during the egg-laying period. Sufficient irrigation or rainfall must follow to move the active ingredient through the thatch.

Novartis Crop Protection

Novartis Crop Protection
410 S. Swing Road
Greensboro, NC 27409
(336) 632-0238
Website: http://www.co.us.novartis.com

Larval Insecticide: Diazinon is the active ingredient in DZN® 50W.

Comments: According to Villani and coworkers (1988) diazinon, applied as Diazinon 5G at 3.0 pounds per acre (lb/a) (3.4 kilogram (kg) actual ingredient per hectare (ai/ha), gave very poor control (25%). According to Moore (1980), Diazinon 500 AG applied at the rate of 5.5 lb/a (6.16 kg ai/ha) gave effective control (near 90%) 1 year and moderate control (74%) the next year.

Rhone-Poulenc Ag Company

P.O. Box 12014
2 T. W. Alexander Drive
Research Triangle Park, NC 27709
(919) 549-2000
Website:http://www.rp\ag.com

Adult Insecticide: Carbaryl is the active ingredient in several formulations. The formulations containing carbaryl are (1) Sevin® XLR, a suspension of microfine Sevin carbaryl insecticide in an aqueous medium, (2) Sevin® 80S, a dry powder for dispersion in water, and (3) Sevin® 50W, a dry powder for dispersion in water.

Comment: Probably the insecticide most commonly used to control JB. According to Jubb, Sevin® 50W at the rate of 1.0 lb per 100 gallons of spray was effective on JB on grape (1982; *Insect. and Acar. Tests* 7:39). According to Lawrence and coworkers (1973), carbaryl was very effective; if rainfall does not occur or if light showers occur, the protective action will last at least 7 days.

St. Gabriel Laboratories

14540 John Marshall Highway
Gainesville, VA 20155-1605
(800) 801-0061
(703) 754-3823
Website: http://www.milkyspore.com

Larval Insecticide: *Bacillus popilliae* is the important biological agent present in Milky Spore.

Comments: As a selective biological insecticide which controls the grub stage of JB, only one application is needed for lasting control. However, months may elapse before control occurs.

Speer Products

4242 BF Goodrich Blvd.
Memphis, TN 38118
(901) 362-1950

Adult Insecticide: The compound d-phenothrin is used for the control of adults on aircraft.

Comment: This is one of two compounds authorized for use on aircraft.

United Agri Products

419 18th St.
Greeley, CO 80631
(970) 356-4400 (for information)
Website: http://www.greenbook.net (for labels)

Adult Insectide: Malathion is the active ingredient in several formulations, such as Malathion 55 Clean Crop® and Malathion 8EC Clean Crop®

Comments: Malathion 55 Clean Crop® controls JB adults on ornamentals; Malathion 8EC Clean Crop® controls JB adults on roses, flowers, and flowering ornamentals.

Valent USA Corporation

133 N. California Blvd., Suite 600
Walnut Creek, CA 94596
(800) 89-VALENT
(925) 256-2700
Website: http://www.valent.com

Adult Insecticide: Acephate is the active ingredient in Orthene® Turf, Tree, Ornamental Spray and Orthene® Turf, Tree, Ornamental WSP, a water soluble powder.

Comments: Acephate is used to control the adult JB on trees, shrubs, and certain outdoor floral crops. According to Lawrence and coworkers (1973; *J. Econ. Entomol.* 66:477-479), activity will remain in spite of light rains.

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Appendix J

Aircraft Information

Sources of Information

Several sources will supply information about aircraft:

1. The USDA-APHIS *Treatment Manual* also contains information on aircraft treatments (T409) and aircraft volumes. Similar information on aircraft volumes appears in the following section.
2. The latest edition of Air Force Regulation 161-71, paragraph 4, entitled *How to Disinfect Aircraft* contains information on requirements for aerosol disinfestation of U.S. Air Force aircraft.
3. The *Aircraft Volume Manual* may be found in each Regional Office.

Aircraft manufacturers will supply information about their aircraft:

Airbus Industries of North America, Inc.

593 Herndon Parkway
Herndon, VA 20170
(703) 834-3400
Fax: (703) 834-3550
Website: http://www.airbus.com/body.html

Boeing Commercial Aeroplane Group

P. O. Box 3707, Mail Stop 74-31
Seattle, WA 98124-2207
Telephone:(425) 237-3657
Website: http://www.boeing.com/commercial.com

Fairchild Dornier Corp.

P. O. Box 790490
San Antonio, TX 78279-0490
Telephone:(210) 824-2313
Website: http://www.faidor.com/

McDonald-Douglas Corporation

Military Aircraft Section
P. O. Box 516
St. Louis, MO 63166
(314) 233-5360
Fax:(314) 232-7528

Other Aircraft Manufacturers

Aerospatiale

Website: http://www.aerospatiale.fr/produits/avions

Casa

Website: http://www.casa.es

Aircraft Volumes

The information in the following table is similar to the information contained in Table 5.5.1 of the *Treatment Manual*. This table lists aircraft frequently encountered in program inspections.

The spray rate of 10% d-phenothrin is 5 gram/second; the aerosol cans are designed to deliver the aerosol at this rate.

The figures in the four columns on the right are:

(1) volume of aircraft compartment in cubic feet

(2) units in 1,000 cubic feet

(3) grams needed per 1,000 cubic feet - always 8

(4) the number of seconds to spray the aerosol

NOTICE

Because of aircraft modifications, actual volumes may vary from those within the table.

TABLE J-1: Airbus Industries

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
A300	Cabin	27,100	27.1	8	43.5
	Pit-#1	3,722	3.7	8	6.0
	Pit-#2	1,265	1.3	8	2.0
	Pit-#3	565	.6	8	1.0
A300-600R	Cabin	?			
(passenger)	Forward	1,134	1.1	8	2.0
(long-range)	Aft	1,134	1.1	8	2.0
	Bulk	400	.4	8	0.5
A300-600	Main	9,950	10.0	8	16.0
(freighter)	Pit-Fwd	1,900	1.9	8	3.0
	Pit-Aft	2,250	2.2	8	3.5
A300-600	Main	19,069	19.1	8	30.5
(FEDEX)	Pit-Fwd	2,684	2.7	8	4.5
	Pit-Aft	2,154	2.2	8	3.5
	Pit-Back	742	.7	8	1.0
A300	Main	11,943	11.9	8	19.0
(convertible)					
A300B4	Main	9,950	10.0	8	16.0
(freighter)	Pit-Fwd	1,900	1.9	8	3.0
	Pit-Aft	1,850	1.9	8	3.0
A310	Main	7,950	8.0	8	13.0
(freighter)	Pit-Fwd	1,260	1.3	8	2.0
	Pit-Aft	1,550	1.6	8	2.5
A310	Main	14,650	14.7	8	23.5
(FEDEX)	Pit-Fwd	1,942	1.9	8	3.0
	Pit-Aft	1,271	1.3	8	2.0
	Pit-Back	742	.7	8	1.0
A320-200	N/A	982	.9	8	1.5
(passenger)					

TABLE J-2: Antonov

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
AN 124 and 126	N/A	26,485	26.5	8	42.5

TABLE J-3: ATR

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
ATR 42 (CTO) (Container Transport Option)	Bulk	890	.9	8	1.5
ATR 72 (CTO)	Bulk	1,285	1.3	8	2.0

TABLE J-4: BAC (British Aircraft Corp)

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
111-200, 300, and 400	Cabin	4,056	4.1	8	6.5
	Pit-Fwd	380	.4	8	0.5
	Pit-Aft	154	.2	8	0.5
111-500	Cabin	5,094	5.1	8	8.0
	Pit-Fwd	451	.5	8	1.0
	Pit-Aft	260	.3	8	0.5
VC 10	Cabin	6,750	6.8	8	11.0
	Pit-Fwd	744	.7	8	1.0
	Pit-Aft	820	.8	8	1.5
Super VC 10	Cabin	7,850	7.9	8	12.5
	Pit-Fwd	744	.7	8	1.0
	Pit-Aft	820	.8	8	1.5

TABLE J-5: BAC (Aerospatiale)

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
Concorde	Cabin	5,100	5.1	8	8.0
	Pit-Fwd	241	.2	8	0.5
	Pit-Aft	468	.5	8	1.0

TABLE J-6: Boeing

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
707-120, 120B, and 220	Cabin	7,484	7.5	8	12.0
	Pit-Fwd	755	.8	8	1.5
	Pit-Aft	910	.9	8	1.5
	Fl.Deck	451	.5		1.0
707-320C	Bulk	7,548	7.5	8	12.0

TABLE J-6: Boeing (continued)

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
707-320, 420	Cabin	8,074	8.0	8	13.0
	Pit-Fwd	870	.9	8	1.5
	Pit-Aft	905	.9	8	1.5
	Fl. Deck	451	.5	8	1.0
720	Cabin	6,860	6.9	8	11.0
	Pit-Fwd	688	.7	8	1.0
	Pit-Aft	690	.7	8	1.0
	Fl. Deck	451	.5	8	1.0
727-100C	Bulk	4,168	4.2	8	7.0
727-100 (passenger)	Cabin	4,560	4.6	8	7.5
	Pit-Fwd	900	.9	8	1.5
	Pit-Aft	425	.4	8	0.5
	Fl. Deck	451	.5	8	1.0
727-200C	Bulk	8,032	8.0	8	13.0
727-200 (passenger)	Cabin	6,561	6.6	8	10.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	760	.8	8	1.5
	Fl. Deck	451	.5	8	1.0
	Lower Hold	875			
737-100	Cabin	4,636	4.6	8	7.5
	Pit-Fwd	370	.3	8	0.5
	Pit-Aft	505	.4	8	0.5
737-200 (passenger)	Cabin	4,636	4.6	8	7.5
	Pit-Fwd	370	.4	8	0.5
	Pit-Aft	505	.5	8	1.0
737-200C	Bulk	3,602	3.6	8	6.0
737-300	Cabin	4,900	5.6	8	8.0
	Pit-Fwd	425	.4	8	1.0
	Pit-Aft	650	.8	8	1.0
	Fl. Deck	225	.2	8	0.5
737-400	Cabin	5,600	5.6	8	9.0
	Pit-Fwd	600	.6	8	1.0
	Pit-Aft	770	.8	8	1.5
	Fl. Deck	225	.2	8	0.5
737-500	Cabin	4,340	4.3	8	7.0
	Pit-Fwd	290	.3	8	0.5
	Pit-Aft	535	.5	8	1.0
	Fl. Deck	255	.3	8	0.5
747 Combi	—	6,886	6.9	8	11.0
747F	—	22,952	23.0	8	37.0
747-100, 200	Cabin	27,650	27.7	8	44.5
	Pit-Fwd	3,485	3.5	8	6.0
	Pit-Aft	3,015	3.0	8	5.0
	Fl. Deck	920	.9	8	1.5
	U. Deck	1,370	1.4	8	2.0
	Belly	1,000	1.0	8	1.5

TABLE J-6: Boeing (continued)

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
747-300,400	Cabin	27,650	27.7	8	44.5
	Pit-Fwd	3,485	3.5	8	5.5
	Pit-Aft	3,015	3.0	8	5.0
	Fl. Deck	920	.9	8	1.5
	U. Deck	2,800	2.8	8	4.5
	Belly	1,000	1.0	8	1.5
757-200 (passenger)	Pit-Fwd	652	.6	8	1.0
	Pit-Aft	1,086	1.1	8	2.0
757-200PF	Bulk	8,405	8.4	8	13.5
767-200	Main	14,255	14.3	8	23.0
	Pit-Fwd	1,470	1.5	8	2.5
	Pit-Aft	1,470	1.5	8	2.5
767-300 (passenger)	Cabin	10,497	10.5	8	17.0
	Pit-Fwd	1,920	1.9	8	3.0
	Pit-Aft	1,680	1.7	8	2.5
	Aft+Bulk	430	.4	8	0.5
777-200	Cabin	20,700	20.7	8	33.0
	Pit-Fwd	280	.3	8	0.5
	Pit-Aft	4,630	4.6	8	7.5
	Aft+Bulk	4,220	4.2	8	6.5

TABLE J-7: Canadair

Aircraft, model, and series	Area	Volume ft_3	Aerosol Calculations		
			1,000 ft_3 Units	Grams / 1,000 ft_3	Spray Time in Seconds
CL-44	Bulk	6,235	6.2	8	10.0
CL-440	Bulk	13,798	13.8	8	22.0

TABLE J-8: Casa

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
C-212	N/A	777	.8	8	1.5
ATR 72 (CTO)	N/A	1,528	1.5	8	2.5

TABLE J-9: Cessna

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
Caravan	N/A	452	.5	8	1.0

TABLE J-10: Convair

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
240	Cabin	1,650	1.7	8	2.5
	Pit-Fwd	193	.2	8	0.5
	Belly	88	.1	8	----[1]
340 & 44-	Cabin	1,816	1.8	8	3.0
	Pit-Fwd	158	.2	8	0.5
	Pit-Aft	193	.2	8	0.5
	Belly	78	.1	8	---[1]
880 & 800M	Cabin	5,802	5.8	8	9.5
	Pit-Fwd	415	.4	8	0.5
	Pit-Aft	488	.5	8	1.0
990	Cabin	6,336	6.3	8	10.0
	Pit-Fwd	488	.5	8	1.0
	Pit-Aft	497	.5	8	1.0

1 In these small volume spaces, use the extender and calculate the application time using a rate of 2.5 grams per second. At a rate of 2.5 grams per second, the following table will give the spray time.

1,000 ft^3 Units	Spray Time in Seconds
.1	0.5
.2	0.5
.3	1.0
.4	1.5

TABLE J-11: de Havilland

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
Dash 7, Series 100 (all cargo)	N/A	240	.2	8	0.5
DHC-6 Twin Otter, Series 300 (cargo version)	Fwd Aft Bulk	38 88 384	.1 .1 .4	8 8 8	-----[1] -----[1] 0.5
Dash 7, Series 100, Combi (50 passengers)	N/A	240	.2	8	0.5
Dash 7, Series 100, Combi (18 passengers)	N/A	240	.2	8	0.5
Dash 8, Series 300, Combi (49 passengers)	N/A	400	.4	8	0.5
Dash 8, Series 100, Combi (37 passengers)	N/A	300	.3	8	0.5
Dash 8, Series 100, Combi (20 passengers)	N/A	775	.8	8	1.5

1 In these small volume spaces, use the extender and calculate the application time using a rate of 2.5 grams per second. At a rate of 2.5 grams per second, the following table will give the spray time.

1,000 ft^3 Units	Spray Time in Seconds
.0	0.5
.2	0.5
.3	1.0
.4	1.5

TABLE J-12: Dornier

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
228-212	N/A	642	.6	8	1.0

TABLE J-13: Embraer

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
EMB-120 Brasilia	N/A	1,193	1.2	8	2.0
EMB-110 Brasilia	N/A	523	.5	8	1.0

TABLE J-14: Fairchild

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
Expediter	NA	580	.6	8	1.0
Metro II & IIA	NA	580	.6	8	1.0
F27	Cabin Pit	2,900 192	2.9 .2	8 8	4.5 0.5
FH11227	Cabin Pit	3,200 192	3.2 .2	8 8	5.0 0.5

TABLE J-15: Fokker

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
F27	N/A	198	.2	8	0.5
F28	N/A	290	.3	8	0.5
F100C	Bulk	2,070	2.0	8	3.0

TABLE J-16: Lockheed

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
Electra	Cabin Pit-Fwd Pit-Aft	5,160 254 274	5.2 .3 .3	8 8 8	8.5 0.5 0.5
L1011 (100) (200) (250)	Cabin Pit-Fwd Pit-Ctr Pit-Aft Galley	23,100 1,600 1,600 700 1,380	23.1 1.6 1.6 .7 1.4	8 8 8 8 8	37.0 2.5 2.5 1.0 2.0
L-1011-1	Cargo Holds	3,900	3.9	8	6.0
L-100-30	N/A	6,057	6.1	8	10.0

TABLE J-17: McDonnel-Douglas

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
DC-3	Bulk	1,300	1.3	8	2.0
DC-6 (cargo)	Bulk	3,354	3.4	8	5.5
DC-6 (passengers)	Cabin	4,332	4.3	8	7.0
	Pit-Fwd	200	.2	8	0.5
	Pit-Aft	173	.2	8	0.5
DC-6A	Cabin	4,375	4.4	8	7.0
	Pit-Fwd	267	.3	8	0.5
	Pit-Aft	300	.3	8	0.5
DC-6B	Cabin	4,375	4.4	8	7.0
	Pit-Fwd	276	.3	8	0.5
	Pit-Aft	242	.2	8	0.5
DC-7B	Cabin	4,612	4.6	8	7.0
	Pit-Fwd	267	.3	8	0.5
	Pit-Aft	364	.4	8	0.5
DC-7C	Cabin	4,778	4.8	8	7.5
	Pit-Fwd	312	.3	8	0.5
	Pit-Aft	339	.3	8	0.5
DC-8-50	Cabin	12,911	12.9	8	20.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	700	.7	8	1.0
DC-8-54F	Main	5,984	6.0	8	9.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	700	.7	8	1.0
DC-8-55F	Main	5,878	5.9	8	9.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	700	.7	8	1.0
DC-8-61 & 63	Cabin	15,955	16.0	8	25.5
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
DC-8-62	Cabin	13,739	13.7	8	22.0
	Pit-Fwd	799	.8	8	1.5
	Pit-Aft	816	.8	8	1.5
DC-8-62CF	Main	6,442	6.4	8	10.0
	Pit-Fwd	800	.8	8	1.5
	Pit-Aft	815	.8	8	1.5
DC-8-63F and DC-8-73F	Main	10,350	10.4	8	16.5
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
DC-8-71CF	Main	8,148	8.1	8	13.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
DC-8-61CF & 71CF	Main	15,472	15.5	8	25.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0

TABLE J-17: McDonnel-Douglas (continued)

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
DC-9-10	Cabin	4,056	4.1	8	6.5
	Pit-Fwd	1,000	1.0	8	1.5
	Pit-Aft	619	0.6	8	1.0
DC-9-10AF	Main	2,386	2.4	8	4.0
	Pit-Fwd	373	.4	8	0.5
	Pit-Aft	327	.3	8	0.5
DC-9-30	Cabin	5,094	5.1	8	8.0
	Pit-Fwd	1,386	1.4	8	2.0
	Pit-Aft	832	.8	8	1.5
DC-9-32AF	Main	3,300	3.3	8	5.5
	Pit-Fwd	562	.6	8	1.0
	Pit-Aft	333	.3	8	0.5
DC-9-33CF	Main	2,944	2.9	8	4.5
	Pit-Fwd	562	.6	8	1.0
	Pit-Aft	333	.3	8	0.5
DC-40	Cabin	5,535	5.5	8	9.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1.040	1.0	8	1.5
DC-10-10CF & 10F, also DC-10-30CF & 30F	Main	12,236	12.2	8	19.5
	Pit-Fwd	3,020	3.0	8	5.0
	Pit-Ctr	1,935	1.9	8	3.0
	Pit-Aft	510	.5	8	1.0
	Fl. Deck	400	.4	8	0.5
MD 8-61/63	Main	11,173	11.2	8	18.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
MD8-62	Main	8,862	8.9	8	14.0
	Pit-Fwd	800	.8	8	1.5
	Pit-Aft	815	.8	8	1.5
MD9-10	Main	3,582	3.6	8	6.0
	Pit-Fwd	393	.4	8	0.5
	Pit-Aft	254	.3	8	0.5
MD9-30	Main	4,525	4.5	8	7.0
	Pit-Fwd	562	.6	8	1.0
	Pit-Aft	333	.3	8	0.5
MD9-40	Main	4,926	4.9	8	8.0
	Pit-Fwd	618	.6	8	1.0
	Pit-Aft	350	.4	8	0.5
MD-11F	Main Deck	15,530	15.5	8	25.0
	Lower Deck	4,976	5.0	8	8.0
MD-11 Combi	Main	5,822	5.8	8	9.5
	Pit-Fwd	3,655	3.7	8	6.0
	Pit-Ctr	2,685	2.7	8	4.5
	Pit-Aft	510	.5		1.0
MD-80 JT8D-217C	Lower Hold	1,253	1.3	8	2.0

TABLE J-17: McDonnel-Douglas (continued)

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
MD-80 JT8D-219	Lower Hold	1,013	1.0	8	1.5
MD 81 & 82	Cargo	1,253	1.3	8	2.0
MD-83	Cargo	1,013	1.0	8	1.5
MD-87	Cargo	938 or 697	.9 .7	8 8	1.5 1.0
MD-88	Cargo	1,013 or 1,253	1.0 1.3	8 8	1.5 2.0

TABLE J-18: SAAB

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
340 B/QC	N/A	1,303	1.3	8	2.0

TABLE J-19: Shorts

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
330	N/A	1,230	1.2	8	2.0
360 and 360-F	N/A	1,450	1.5	8	2.5

TABLE J-20: Sidely

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
Carvelle	Cabin	5,600	5.6	8	9.0
	Pit-Fwd	258	.3	8	0.5
	Pit-Aft	116	.1	8	---[1]

1 In these small volume spaces, use the extender and calculate the application time using a rate of 2.5 grams per second. At a rate of 2.5 grams per second, the following table will give the spray time.

1,000 ft^3 Units	Spray Time in Seconds
.1	0.5
.2	0.5
.3	1.0
.4	1.5

TABLE J-21: Tupolev

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
TU-154	Bulk	5,000	5.0	8	8.0

TABLE J-22: Vickers

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
Merchantman	Bulk	5,040	5.0	8	8.0
Viscount	Bulk	3,000	3.0	8	5.0

TABLE J-23: Military Aircraft

Aircraft, model, and series	Area	Volume ft^3	Aerosol Calculations		
			1,000 ft^3 Units	Grams / 1,000 ft^3	Spray Time in Seconds
C-5A	Main	46,651	46.7	8	74.5
	U. Deck	6,147	6.1	8	10.0
	Fwd. & Fl. Deck	5,147	5.1	8	8.0
	U. Floor	6,294	6.3	8	10.0
C-17	Main	20,875	20.9	8	33.5
C-26	Cabin	500	.5	8	1.0
	Pit	198	.2	8	0.5
C-130	Main	8,340	8.3	8	13.5
C-130 LG382		4,737	4.7	8	7.5
C-130 LG385-G		6,057	6.1	8	10.0
C-135	Cabin	6,000	6.0	8	9.5
C-141	Main	12,000	12.0	8	19.0
C-141B	Main	13,701	13.7	8	22.0
KC-10	Cabin	4,056	4.1	8	6.5
	Pit-Fwd	1,000	1.0	8	1.5
	Pit-Aft	619	.6	8	1.0

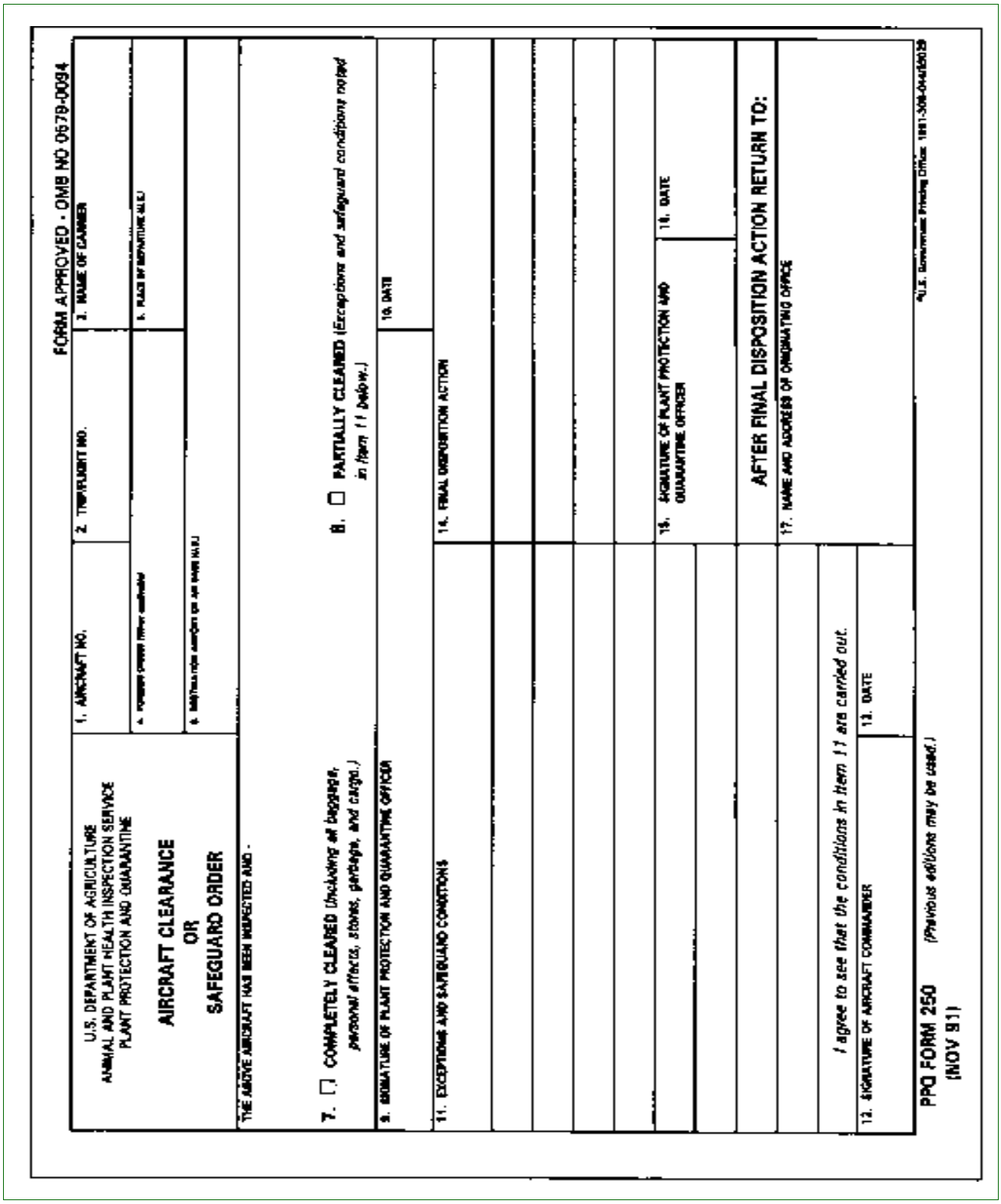
Appendix K

PPQ Form 250
Aircraft Clearance or Safeguard Order

Use of PPQ Form 250

If requested by personnel at a destination airport, issue an Aircraft Clearance or Safeguard Order (PPQ Form 250) to the pilot after treating an aircraft. However, if personnel do not request a PPQ Form 250, do not issue this document.

The following page shows a sample PPQ Form 250, Aircraft Clearance or Safeguard Order.



FORM APPROVED - OMB NO 0579-0094

U.S. DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE

AIRCRAFT CLEARANCE OR SAFEGUARD ORDER

1. AIRCRAFT NO.
2. TRIP/FLIGHT NO.
3. NAME OF CARRIER
4. FOREIGN PORT(S) WHERE CLEARED
5. PLACE OF DEPARTURE (U.S.)
6. MAY BE USED AT ANY PORT (U.S.)

THE ABOVE AIRCRAFT HAS BEEN INSPECTED AND -

7. ☐ COMPLETELY CLEARED (Including all baggage, personal effects, stores, garbage, and cargo.)
8. ☐ PARTIALLY CLEARED (Exceptions and safeguard conditions noted in Item 11 below.)

9. SIGNATURE OF PLANT PROTECTION AND QUARANTINE OFFICER
10. DATE

11. EXCEPTIONS AND SAFEGUARD CONDITIONS

14. FINAL DISPOSITION ACTION

15. SIGNATURE OF PLANT PROTECTION AND QUARANTINE OFFICER
16. DATE

AFTER FINAL DISPOSITION ACTION RETURN TO:

17. NAME AND ADDRESS OF ORIGINATING OFFICE

I agree to see that the conditions in Item 11 are carried out.

12. SIGNATURE OF AIRCRAFT COMMANDER
13. DATE

PPQ FORM 250 (NOV 91) *(Previous editions may be used.)*

*U.S. Government Printing Office: 1991-306-044/45029

FIGURE K-1: PPQ Form 250